Control No. 2016-____
Recording Requested by
and when Recorded, return to:

CITY OF MILPITAS
455 E. CALAVERAS BOULEVARD
MILPITAS, CA 95035-5479

Attn: City Clerk
Exempt From Recording Fees per Government code 6103 and 27383

(SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE)

Document Transfer Tax is $ __0__
( ) Computed on full value of property conveyed
( ) Computed on full value less value of liens and encumbrances remaining
City transfer tax is $ __0__

STORMWATER MANAGEMENT FACILITIES
OPERATION AND MAINTENANCE AGREEMENT
FOR TRAVERSE, Tract 10224

This Stormwater Management Facilities Operation and Maintenance Agreement ("AGREEMENT") is made and entered into this _____ day of _____ 2016 ("Effective Date"), by and between _____ ("Property Owner") and the City of Milpitas, a municipal corporation of the State of California ("City").

RECITALS

This AGREEMENT is made and entered into with reference to the following facts:

A. **WHEREAS**, the Property Owner is the owner of real property more particularly depicted and described on the attached as **Exhibit A** ("Property") and fully incorporated herein by reference; and

B. **WHEREAS**, the Property Owner received entitlements from the City allowing the development of the Property, including the construction of 206 residential units with, emergency vehicle access, utilities, and associated offsite and onsite improvements landscaping, irrigation, and stormwater treatment measures on a 12.51 acre site located at 69-625 Trade Zone Blvd in Milpitas and more commonly known as Traverse Project No. PJ2874, (the "Project") on the Property; and subject to conditions set forth in the following (collectively "City Approvals"):

1. Resolution No. 8267 approving Site Development Permit No. SD13-0008,

2. Resolution No. 8267 approving Major Tentative Map No. MT13-0004,

3. Resolution No. 8267 approving Conditional Use Permit No. UP13-0005, and

C. **WHEREAS**, discharges to the City's municipal separate storm sewer system ("MS4") are regulated under state and federal law pursuant to Waste Discharge Requirements and National Pollutant Discharge Elimination System permit ("MS4 Permit") issued by the Regional Water Quality Control Board, San Francisco Region ("Regional Board").

D. **WHEREAS**, pursuant to the requirements of the MS4 Permit and the City's Stormwater and Urban Runoff Pollution Control Ordinance as codified in Milpitas Municipal Code Chapter 16 ("Ordinance"), the City Approvals require the Property Owner to install, operate and maintain, at no cost or expense to the City, the Permanent Stormwater Pollution Prevention Measures ("BMPs") more particularly described in the City-approved Stormwater Control Operation and Maintenance Plan (sometimes referred to herein as "Plan") for the Project attached hereto as **Exhibit B** and fully incorporated herein by reference; and

E. **WHEREAS**, the Stormwater Control Operation and Maintenance Plan may be subsequently modified from time to time with City's written approval and such changes shall be fully incorporated as part of this Agreement by this reference; and

F. **WHEREAS**, the Stormwater Control Operation and Maintenance Plan includes provisions for the BMP Operation and Maintenance and an annual inspection checklist for the BMPs constructed on the Property, and

G. **WHEREAS**, this Agreement memorializes the Property Owner's maintenance, operations, and inspection obligations under the City's Ordinance and the approved Stormwater Control Operation and Maintenance Plan.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

SECTION 1. Responsibility for Operation and Maintenance:

The Property Owner, at its sole cost and expense, shall construct and install the BMPs shown in Exhibit B in accordance with the plans approved by and on file with the City. Property Owner shall diligently maintain in perpetuity the BMPs in a manner assuring peak performance at all times, shall make such changes or modifications to the BMPs, subject to City's prior approval as may be reasonably necessary for the BMPs to continue to operate as designed and approved and to accomplish its intended purpose and in good repair, and in compliance with all applicable Federal, State, County and local laws and regulations, including but not limited to the Ordinance, as the same may be amended, revised, and/or replaced from time to time. The Owner shall be responsible for the costs incurred in operating, maintaining, repairing and replacing the BMPs. Property Owner shall not destroy or remove the BMPs or modify any measure in any manner that would lessen its effectiveness. Property Owner shall make available copies of the approved Stormwater Control Operation and Maintenance Plan at the site with the facility or property manager.

SECTION 2: Inspection by Property Owner:

The Property Owner, at its sole cost and expense, shall conduct annual inspections of all permanent installed BMPs per the Plan. The annual inspection report shall include completion of the checklist described in the approved Stormwater Control Operation and Maintenance Plan. The BMPs must be inspected by a qualified independent inspector who is acceptable to the City. The Property Owner shall submit the Inspection Report on these BMPs to the City Engineer no later than July 15th of each year.

SECTION 3. Facility Inspection by the City:

(a) Right of Entry. The Property Owner, on its behalf and on behalf of its successors and assigns, grants permission to the City, the inspectors of the Regional Board, and local mosquito and vector control agency, and their authorized agents and employees, to enter the Property, and to inspect the BMPs whenever the City deems necessary to enforce provisions of the Ordinance, this Agreement, or any other local or state requirements. The City may enter the premises at any reasonable time during normal business hours and upon at least 48 hours prior written notice (except that prior written notice is not required in case of emergency) to inspect the premises related to BMPs and BMP operation and maintenance, to inspect and copy records related to storm water compliance, and to collect samples and take measurements related to BMPs. The Property Owner shall deposit and maintain a Private Job Account with the City a minimum balance of Four Thousand Dollars ($4,000) for inspection by City Staff pursuant to this Section 3. The deposit of four Thousand Dollars ($4,000.00) shall be made simultaneously with the execution of this Agreement.

(b) Security. The City may require the Owner, its successors and assigns, from time to time, to post security in a form, amount, and for a time period satisfactory to City to guarantee performance of the obligations stated herein. Should the Owner, its successors and assigns, fail to perform the obligations under this Agreement, the City may, in the case of a cash bond, act for the Owner, its successors and assigns, using the proceeds from such cash bond, or in the case of a surety bond, require the surety to perform the obligations of this Agreement.

SECTION 4. Failure to Perform Required Facility Repairs or Maintenance by the Property Owner:

(a) Enforcement Action. If the Property Owner or its successors fail to operate and maintain the BMPs in good working order and in accordance with the approved Plan and the City's Ordinance, the City may, but is not required to, pursue any enforcement action available at law or in equity to cause the completion of all maintenance and may charge the costs of such enforcement action against the Property Owner in any manner authorized by law or in equity.

(b) City Maintenance. In the event of Property Owner's failure to operate and maintain BMPs in accordance with the Plan and the City's Ordinance, the City may also, with prior written notice, enter the Property to return the BMPs to good working order; provided however that the Property Owner shall have 30 days after any such notice, or such other time provided by law, to cure the relevant failure and provided further that the Property Owner shall have such additional time after the initial 30 days to complete a cure so long as Property Owner commences the cure within the initial 30 days and diligently prosecutes the cure to completion. Notwithstanding the foregoing, City may in its sole discretion enter the Property to return the BMPs to good working in an emergency and take any other necessary action to mitigate an emergency without any notice to Property Owner. The City is under no obligation to maintain or repair the BMPs, and this Agreement may not be construed to impose any such obligation on the City. If the City, under this Section 4 takes any action to return the BMPs to good working order, the Property Owner

shall reimburse the City for all the reasonable costs and expenses incurred by the City. The City will provide the Property Owner with an itemized invoice of the City's costs and expenses and the Property Owner shall make full payments to the City within thirty (30) days of the date of the invoice. If the Property Owners fails to pay the invoice within thirty (30) days, the City shall be entitled to cause a lien for any such unpaid maintenance expense bill to be recorded against the Property. In addition, the City shall be entitled to have the unpaid amount of the invoice placed as a special assessment on the next regular tax bill levied against the Property, after which such assessment shall be collected in the same manner as ordinary municipal taxes are collected, and shall be subject to the same penalties and same procedures under foreclosure and sale in the case of delinquency as provided for ordinary municipal taxes. The actions described in this section are in addition to and not in lieu of other legal remedies provided by law. Notwithstanding the above, it is understood that City is under no obligation to repair or maintain the BMPs, and in no event shall this Agreement be construed to impose any such obligation on City.

(c) Specific Performance. The provisions of this Agreement are expressly declared to be for the benefit of the City. The City may bring an action to obtain specific performance of this Agreement and may recover its costs, including attorney fees, incurred in bringing such action.

SECTION 5: Successors and Assigns:

Property Owner hereby declares that the Property shall be held, transferred, encumbered, used, conveyed, leased and occupied subject to the covenants, conditions, restrictions, easements and rights set forth herein for the use and benefit of each of the Lots. All of the limitations, easements, uses, obligations, covenants, restrictions and conditions stated herein shall run with the Property and shall be binding upon Property Owner, its successors and assigns, any and all parties having or acquiring any right, title or interest in or to the Property or any part thereof or interest therein and shall inure to the benefit of and be binding upon each successor-in-interest thereto.

Upon transfer of the property, the Property Owner shall provide the new owner with the current Plan and a copy of this Agreement and shall, in any event, be released from all obligations under this Agreement as of the effective date of the transfer of the Property.

SECTION 6. Indemnity:

The Property Owner, on Property Owner's behalf and on behalf of all successors in interest pursuant to Section 5 of this Agreement, shall indemnify, release, hold harmless, and defend the City and its authorized agents and employees from and against any and all demands, suits, liabilities, fines, losses, damages, accidents, casualties, occurrences or claims, including reasonable attorneys' fees, against the City which may in anyway arise or relate to the construction, operation, presence, existence or maintenance of the BMPs, or from any personal injury or property damage that may arise or relate from the City entering the property under Section 4. If a claim is asserted against the City, its authorized agents or employees, the City shall promptly notify the Property Owner and the Property Owner shall defend the claim and any resulting litigation at its sole cost and expense, with counsel approved by City. If any judgment is entered against the City, or its authorized agents or employees, the Property Owner must pay all costs and expenses to satisfy the judgment.

SECTION 7. Severability:

Invalidation of any one of the provisions of this Agreement shall in no way effect any other provisions, and all other provisions shall remain in full force and effect.

SECTION 8. Non-Discrimination:

The Property Owner shall not discriminate, in any way, against any person on the basis of race, sex, color, age, religion, sexual orientation, actual or perceived gender identity, disability, ethnicity, or national origin, in connection with or related to the performance of this Agreement.

SECTION 9. Governing Law:

City and Property Owner agree that the law governing this Agreement shall be that of the State of California and that Property Owner shall comply with all applicable laws, ordinances, codes and regulations of the federal, state and local governments.

SECTION 10. Recordation:

Property Owner shall, within 10 days after the effective date of this Agreement, record or cause the Agreement to be recorded in the Office of the Recorder, Santa Clara County, California, at the expense of the Property Owner, which recording shall constitute notice of the obligations herein set forth and a covenant running with the land and shall be binding upon all of the successors and assigns in title to the Property. In the event Property Owner fails to timely record this Agreement, City shall be authorized but not required to record the Agreement.

SECTION 11. Books and Records:

A. The Property Owner shall maintain any and all ledgers, books of account, invoices, vouchers, cancelled checks, and other records or documents evidencing or relating to charges for services, or expenditures and disbursements or in any way relating to the performance of this Agreement for a minimum period of three (3) years, or for any longer period required by law.

B. Any records or documents required to be maintained pursuant to this Agreement shall be made available for inspection or audit at no cost to City, at reasonable any time during regular business hours, upon at least 48 hours' prior written request by the City Attorney, City Manager, or a designated representative of any of these officers. Copies of such documents shall be provided to City for inspection at City Hall when it is practical to do so. Otherwise, unless an alternative is mutually agreed upon, the records shall be available at the Property Owner's address indicated for receipt of notices in this Agreement.

SECTION 12. Notices:

All notices and other communications required or permitted to be given under this Agreement shall be in writing and shall be personally served or mailed, postage prepaid and return receipt requested, addressed to the respective parties as follows:

To CITY:

City of Milpitas (Utility Engineering)
Attn: Utility Engineer
455 East Calaveras Blvd.
Milpitas, CA 95035

To PROPERTY OWNER: Traverse Homeowners Association
c/o The Manor Association
Attn: Sam Sandy
353 Main Street
Redwood City, CA 94063
650-637-1616

Notice shall be deemed effective on the date personally delivered or, if mailed, three (3) days after deposit in the mail.

SECTION 13. Venue:

In the event that suit shall be brought by either party to this contract, the parties agree that venue shall be exclusively vested in the state courts of the County of Santa Clara, or if federal jurisdiction is appropriate, exclusively in the United States District Court, Northern District of California, San Jose, California.

SECTION 14. Interpretation, Prior Agreements:

This Agreement, including all Exhibits attached hereto, represents the entire understanding of the parties as to those matters contained herein. In the event that the terms specified in any of the Exhibits attached hereto conflict with any of the terms specified in the body of this Agreement, the terms specified in the body of this Agreement shall control. No prior oral or written understanding shall be of any force or effect with respect to those matters covered hereunder. This Agreement may be modified only by a written amendment duly executed by the parties to this Agreement.

[Signatures on Next Page]

IN WITNESS WHEREOF, the Parties execute this Stormwater Management Facilities Operation and Maintenance Agreement as of the last date set forth below:

PROPERTY OWNER:
Traverse Homeowners Association

By:_____
Sam Sandy
The Manor Association
353 Main Street
Redwood City, CA 94063

CITY:

CITY OF MILPITAS, A MUNICIPAL CORPORATION:

Recommended for approval
By:

_____
Greg Chung, Acting City Engineer

Approved as to form
By:

_____
Christopher Diaz, City Attorney

By:

_____
Thomas C. Williams, City Manager

Please note that this is a placeholder for the acknowledgement. So use the most current version of the acknowledgement

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of _____)

On _____, before me, _____, a Notary Public, personally appeared

_____,

_____ personally known to me;

_____ or _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

CAPACITY CLAIMED BY SIGNER:

Though statute does not require the notary to fill in the data below, doing so may prove invaluable to persons relying on the document.

_____ Individual(s)
_____ Corporate Officer(s) Titles _____ and _____
_____ Partner(s) _____ Limited _____ General
_____ Attorney-in-Fact
_____ Trustee(s)
_____ Guardian/Conservator
_____ Other : _____

Signer is representing: _____

ATTENTION NOTARY: Although the information requested below is optional, it could prevent fraudulent attachment of this certificate to unauthorized document.

Title or type of document _____
Number of pages: _____ Date of document: _____
Signer(s) other than named above: _____

THIS CERTIFICATE MUST BE ATTACHED TO THE DOCUMENT DESCRIBED ABOVE

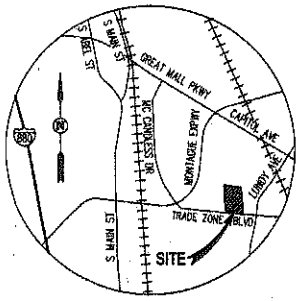
EXHIBIT A

Plat and Description for the site

TRACT 10224
TRAVERSE

FOR CONDOMINIUM PURPOSES
BEING A SUBDIVISION OF THAT CERTAIN GRANT DEED RECORDED JULY 15, 2014 IN DOCUMENT NO. 22645824 OF OFFICIAL RECORDS OF SANTA CLARA COUNTY
CITY OF MILPITAS, COUNTY OF SANTA CLARA, CALIFORNIA

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
SAN RAMON, CALIFORNIA
AUGUST 2014



VICINITY MAP
NOT TO SCALE

OWNER'S STATEMENT

WE HEREBY STATE THAT WE ARE THE OWNERS OF OR HAVE SOME RIGHT, TITLE, OR INTEREST IN AND TO THE REAL PROPERTY INCLUDED WITHIN THE SUBDIVISION SHOWN HEREON; THAT WE ARE THE ONLY PERSONS WHOSE CONSENT IS NECESSARY TO PASS A CLEAR TITLE TO SAID REAL PROPERTY; THAT WE CONSENT TO THE MAKING AND RECORDING OF THIS SUBDIVISION MAP AS SHOWN WITHIN THE DISTINCTIVE BOUNDARY LINE.

WE HEREBY OFFER FOR DEDICATION TO THE CITY OF MILPITAS IN FEE FOR PUBLIC USE FOR ROADWAY PURPOSES, OPERATION, ALTERATION, RELOCATION, MAINTENANCE, REPAIR AND REPLACEMENT OF ALL PUBLIC SERVICE FACILITIES AND THEIR APPURTENANCES, OVER, UNDER, ALONG AND ACROSS THE FOLLOWING:

1. TRADE ZONE BOULEVARD, JOURNEY STREET, JUBILEE DRIVE, EXPEDITION DRIVE & MOMENTUM DRIVE

WE HEREBY OFFER FOR DEDICATION TO THE CITY OF MILPITAS IN FEE FOR PUBLIC USE FOR PARK AND LANDSCAPING PURPOSES ALONG AND ACROSS THE FOLLOWING:

1. PARCEL A

WE HEREBY OFFER FOR DEDICATION TO THE CITY OF MILPITAS AN EASEMENT FOR PUBLIC USE FOR OPERATION, ALTERATION, RELOCATION, MAINTENANCE, REPAIR AND REPLACEMENT OF ALL PUBLIC SERVICE FACILITIES AND THEIR APPURTENANCES, OVER, UNDER, ALONG AND ACROSS THE FOLLOWING:

1. EASEMENTS "A" FOR PUBLIC SERVICE AND UTILITY EASEMENT PURPOSES (PSUE).

2. EASEMENTS "B" FOR EMERGENCY VEHICLE ACCESS PURPOSES (EAE).

THE ABOVE MENTIONED EASEMENTS (PSUE & EAE) SHALL REMAIN OPEN AND FREE FROM BUILDINGS AND STRUCTURES OF ANY KIND EXCEPT PUBLIC SERVICE AND PUBLIC UTILITY STRUCTURES AND THEIR APPURTENANCES, IRRIGATION SYSTEMS AND THEIR APPURTENANCES AND LAWFUL FENCES, UNOBSTRUCTED CONTINUOUS ACCESS SHALL BE MAINTAINED AT ALL TIMES.

THE UNDERSIGNED HEREBY DECLARES THAT ALL OF THE PRIVATE STREETS (PARCELS B, C, D, E, F, AND G) ARE ESTABLISHED AS ACCESS WAYS FOR THE BENEFIT OF ALL THE CONDOMINIUM OWNERS WITHIN THIS SUBDIVISION, THEIR LICENSES, VISITORS AND TENANTS, BUT ARE NOT OFFERED FOR DEDICATION FOR PUBLIC USE. MAINTENANCE OF SAID PRIVATE STREETS IS TO BE THE RESPONSIBILITY OF THE HOMEOWNER'S ASSOCIATION OF TRACT 10224, ALL IN ACCORDANCE WITH THE SUBDIVISION RESTRICTIONS GOVERNING THIS PROJECT. THE DESIGNATED PRIVATE STREETS ON THIS MAP ARE NOT PART OF THE CITY OF MILPITAS STREET SYSTEM AND ARE NOT ACCEPTED FOR PUBLIC MAINTENANCE.

OWNER:

TRAVERSE PARTNERS, L.L.C., A DELAWARE LIMITED LIABILITY COMPANY

BY: _____

NAME: Joseph W. Killinger

TITLE: Division President

ACKNOWLEDGMENT CERTIFICATE (OWNER'S)

STATE OF California)
COUNTY OF Sacramento)

ON 8/25, 2014, BEFORE ME, Corin C. Elvick, A NOTARY PUBLIC, PERSONALLY APPEARED Joseph Killinger, WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT, AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

WITNESS MY HAND:

SIGNATURE: _____

NAME (PRINT): Corin C. Elvick

PRINCIPAL COUNTY OF BUSINESS: Sacramento

MY COMMISSION NUMBER: 1972924

MY COMMISSION EXPIRES: 3/23/2016

SURVEYOR'S STATEMENT

I CHRISTOPHER S. HARMISON, HEREBY CERTIFY THAT I AM A LICENSED LAND SURVEYOR IN THE STATE OF CALIFORNIA, THAT THIS MAP WAS PREPARED BY ME OR UNDER MY DIRECTION IN MAY 2014 AND IS BASED UPON A FIELD SURVEY IN CONFORMANCE WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF TRAVERSE PARTNERS, L.L.C., A DELAWARE LIMITED LIABILITY COMPANY, IN MAY 2014 AND IS TRUE AND COMPLETE AS SHOWN. I HEREBY STATE THAT THIS FINAL MAP COMPLIES WITH FINAL MAP PROCEDURES OF THE CITY OF MILPITAS AND THAT THIS FINAL MAP SUBSTANTIALLY CONFORMS TO THE APPROVED TENTATIVE MAP AND THE CONDITIONS OF APPROVAL THEREOF WHICH WERE REQUIRED TO BE FULFILLED PRIOR TO THE FILING OF THE FINAL MAP, AND IT IS TECHNICALLY CORRECT. I HEREBY STATE THAT THE MONUMENTS WILL OCCUPY THE POSITIONS INDICATED BY JUNE 2016, AND ARE OF THE CHARACTER INDICATED, AND ARE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

DATED: 8-21-2014

Christopher S. Harmison
CHRISTOPHER S. HARMISON P.L.S.
P.L.S. NO. 7176

LICENSED LAND SURVEYOR CHRISTOPHER S. HARMISON 7176 STATE OF CALIFORNIA

RECORDER'S STATEMENT

FILED THIS 7th DAY OF November, 20 14 AT 2:09 PM IN BOOK OF MAPS 878, AT PAGES 1-9, SERIES NUMBER 22764486
AT THE REQUEST OF FIRST AMERICAN TITLE COMPANY

FEE $24.00

REGINA ALCOMENDRAS
SANTA CLARA COUNTY RECORDER

BY: _____
DEPUTY

2076-20

SHEET 1 OF 9

1-242

878
1-9

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1-242

1

TRACT 10224
TRAVERSE

FOR CONDOMINIUM PURPOSES
BEING A SUBDIVISION OF THAT CERTAIN GRANT DEED RECORDED JULY 15, 2014 IN DOCUMENT NO. 22645824 OF OFFICIAL RECORDS OF SANTA CLARA COUNTY
CITY OF MILPITAS, COUNTY OF SANTA CLARA, CALIFORNIA

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
SAN RAMON, CALIFORNIA
AUGUST 2014

1-242

CITY ENGINEER'S STATEMENT

I HEREBY STATE THAT I HAVE EXAMINED THE WITHIN FINAL MAP; THAT THE SUBDIVISION AS SHOWN THEREIN IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP AND ANY APPROVED ALTERATIONS THEREOF; THAT THIS SUBDIVISION COMPLIES WITH PROVISIONS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCES, APPLICABLE AT THE TIME OF APPROVAL OF THE TENTATIVE MAP.

SIGNED: _____ DATE: 10/28/14
JEFF MONEDA, P.E.
CITY ENGINEER, CITY OF MILPITAS
R.C.E. NO. 60944
EXPIRATION DATE DECEMBER 31, 2014

CITY SURVEYOR'S STATEMENT

I HEREBY STATE THAT I HAVE EXAMINED THE HEREIN MAP AND THAT I AM SATISFIED THAT SAID MAP IS TECHNICALLY CORRECT.

SIGNED: _____ DATE: 10/27/2014
ROBERT S. GULETZ
ACTING CITY SURVEYOR, CITY OF MILPITAS
HARRIS & ASSOCIATES
R.C.E. NO. 24184
EXPIRATION DATE DECEMBER 31, 2015

REGISTERED PROFESSIONAL ENGINEER ROBERT S. GULETZ 24184 EXP. CIVIL STATE OF CALIFORNIA

CITY CLERK'S CERTIFICATE

I, MARY LAVELLE, CITY CLERK OF THE CITY OF MILPITAS, CALIFORNIA, HEREBY CERTIFY THAT SAID CITY COUNCIL, AS GOVERNING BODY OF SAID CITY AT A REGULAR MEETING HELD ON Oct 21, 2014 HAS TAKEN THE FOLLOWING ACTIONS:

1. APPROVED THIS TRACT MAP NO. 10224.
2. ACCEPTED, SUBJECT TO IMPROVEMENT, ON BEHALF OF THE PUBLIC THOSE PARCELS OF LAND OFFERED FOR DEDICATION FOR PUBLIC USE IN CONFORMITY WITH THE TERMS OF OFFER OF DEDICATION TO WIT:
   1. EASEMENTS "A" FOR PUBLIC SERVICE AND UTILITY EASEMENT PURPOSES (PSUE).
   2. EASEMENTS "B" FOR EMERGENCY VEHICLE ACCESS PURPOSES (EAE).
   3. TRADE ZONE BOULEVARD, JOURNEY STREET, JUBILEE DRIVE, EXPEDITION DRIVE AND MOMENTUM DRIVE FOR ROADWAY PURPOSES, IN FEE.
   4. PARCEL A FOR PARK AND LANDSCAPE PURPOSES, IN FEE.
3. FOR ASSESSMENT DISTRICTS CREATED BY THIS GOVERNING BODY, THE COUNCIL HAS DETERMINED THAT PROVISIONS HAVE BEEN MADE FOR SEGREGATION OF THE RESPONSIBILITY OF EACH OF THE PROPOSED NEW PARCELS FOR A PORTION OF ASSESSMENT PAYMENT OBLIGATION IN THE MANNER PROVIDED IN THE STATUTE PURSUANT TO WHICH THE ASSESSMENTS WERE LEVIED: COMMUNITY FACILITIES DISTRICT 2006-1.
4. PURSUANT TO GOVERNMENT SECTION 66499.20.2 OF THE SUBDIVISION MAP ACT, THE FOLLOWING EASEMENTS ARE HEREBY ABANDONED AND ARE NOT SHOWN HEREON: 1) 10' PUBLIC SERVICE AND UTILITY EASEMENT RECORDED FEBRUARY 6, 1970, IN BOOK 8822 OF OFFICIAL RECORDS, AT PAGE 686, SANTA CLARA COUNTY RECORDS; AND 2) 10' PUBLIC SERVICE AND UTILITY EASEMENT RECORDED APRIL 10, 1969, IN BOOK 8494 OF OFFICIAL RECORDS, AT PAGE 358, SANTA CLARA COUNTY RECORDS.

DATED: 10/30/14 _____
MARY LAVELLE
CITY CLERK, CITY OF MILPITAS

TRUSTEE'S STATEMENT

FIRST AMERICAN TITLE INSURANCE COMPANY, A NEBRASKA CORPORATION, AS TRUSTEE UNDER THAT CERTAIN DEEDS OF TRUST RECORDED JULY 15, 2014 AS INSTRUMENT NUMBER 22645825 AND 22645827, SANTA CLARA COUNTY OFFICIAL RECORDS, DOES HEREBY CONSENT TO THE PREPARATION AND RECORDATION OF THIS FINAL MAP AND JOINS IN ALL DEDICATIONS HEREON.

AS TRUSTEE: FIRST AMERICAN TITLE INSURANCE COMPANY, A NEBRASKA CORPORATION

BY: _____ DATE: 9/9/2014
NAME: SYLVIA ERAZO
TITLE: VP, DIRECTOR OF OPERATIONS

878
1-9

ACKNOWLEDGMENT CERTIFICATE (TRUSTEE'S)

STATE OF California)
COUNTY OF Santa Clara)

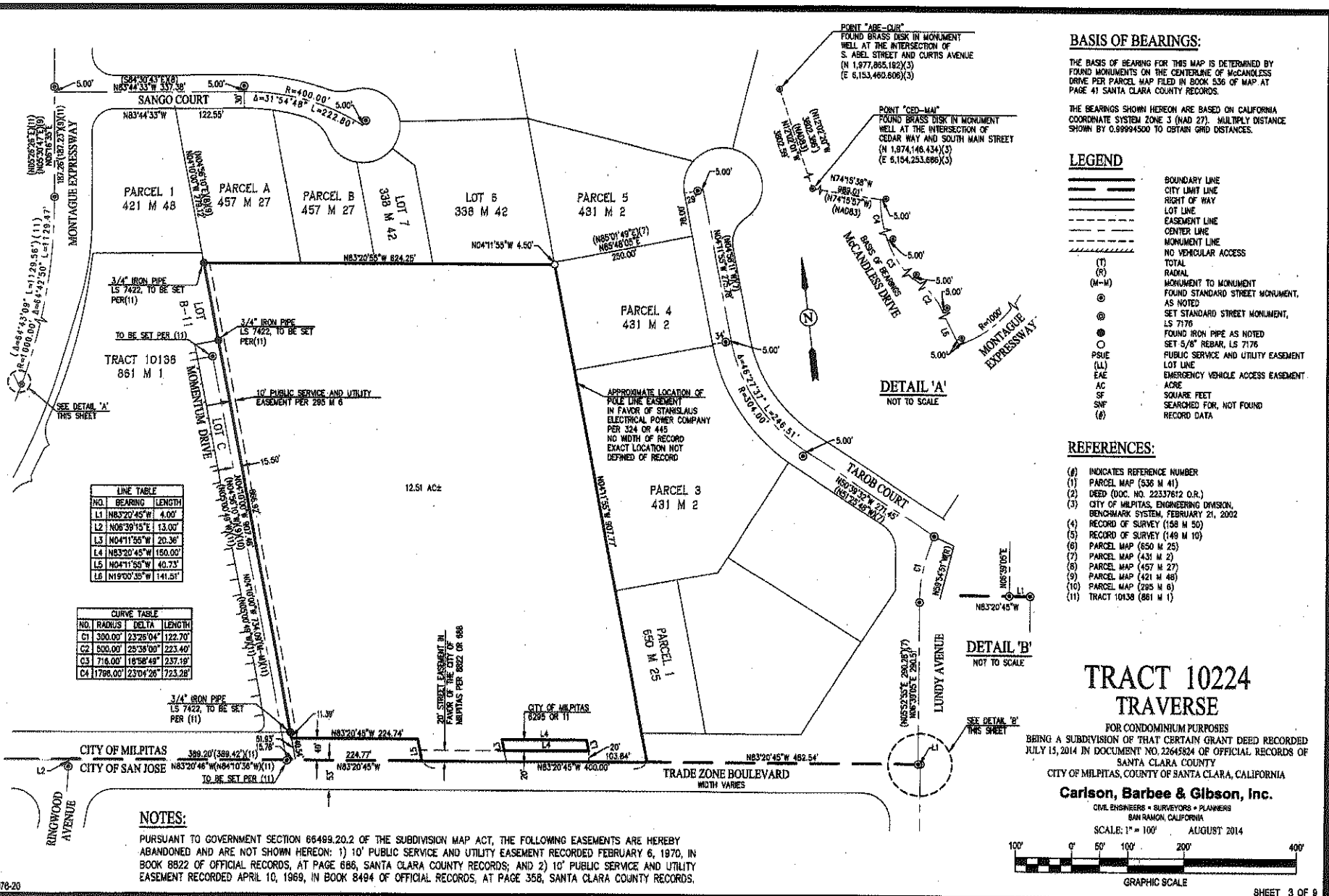
ON Sept. 9, 2014, BEFORE ME, C. Marroquin, A NOTARY PUBLIC, PERSONALLY APPEARED Sylvia Erazo, WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT, AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

WITNESS MY HAND:

SIGNATURE: _____
NAME (PRINT): C. Marroquin
PRINCIPAL COUNTY OF BUSINESS: Santa Clara
MY COMMISSION NUMBER: 2025044
MY COMMISSION EXPIRES: 6/19/17

2
1-242 2



BASIS OF BEARINGS:

THE BASIS OF BEARING FOR THIS MAP IS DETERMINED BY FOUND MONUMENTS ON THE CENTERLINE OF McCANDLESS DRIVE PER PARCEL MAP FILED IN BOOK 536 OF MAP AT PAGE 41 SANTA CLARA COUNTY RECORDS.

THE BEARINGS SHOWN HEREON ARE BASED ON CALIFORNIA COORDINATE SYSTEM ZONE 3 (NAD 27). MULTIPLY DISTANCE SHOWN BY 0.99994500 TO OBTAIN GRID DISTANCES.

LEGEND

	BOUNDARY LINE
	CITY LIMIT LINE
	RIGHT OF WAY
	LOT LINE
	EASEMENT LINE
	CENTER LINE
	MONUMENT LINE
	NO VEHICULAR ACCESS
(T)	TOTAL
(R)	RADIAL
(M-M)	MONUMENT TO MONUMENT
◉	FOUND STANDARD STREET MONUMENT, AS NOTED
◎	SET STANDARD STREET MONUMENT, LS 7176
●	FOUND IRON PIPE AS NOTED
○	SET 5/8" REBAR, LS 7176
PSUE	PUBLIC SERVICE AND UTILITY EASEMENT
(LL)	LOT LINE
EAE	EMERGENCY VEHICLE ACCESS EASEMENT
AC	ACRE
SF	SQUARE FEET
SNF	SEARCHED FOR, NOT FOUND
(#)	RECORD DATA

REFERENCES:

(#) INDICATES REFERENCE NUMBER
(1) PARCEL MAP (536 M 41)
(2) DEED (DOC. NO. 22337612 O.R.)
(3) CITY OF MILPITAS, ENGINEERING DIVISION, BENCHMARK SYSTEM, FEBRUARY 21, 2002
(4) RECORD OF SURVEY (158 M 50)
(5) RECORD OF SURVEY (149 M 10)
(6) PARCEL MAP (650 M 25)
(7) PARCEL MAP (431 M 2)
(8) PARCEL MAP (457 M 27)
(9) PARCEL MAP (421 M 48)
(10) PARCEL MAP (295 M 6)
(11) TRACT 10136 (861 M 1)

TRACT 10224
TRAVERSE

FOR CONDOMINIUM PURPOSES
BEING A SUBDIVISION OF THAT CERTAIN GRANT DEED RECORDED JULY 15, 2014 IN DOCUMENT NO. 22645824 OF OFFICIAL RECORDS OF SANTA CLARA COUNTY
CITY OF MILPITAS, COUNTY OF SANTA CLARA, CALIFORNIA

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
SAN RAMON, CALIFORNIA

SCALE: 1" = 100' AUGUST 2014

100' 0' 50' 100' 200' 400'
GRAPHIC SCALE

NOTES:

PURSUANT TO GOVERNMENT SECTION 66499.20.2 OF THE SUBDIVISION MAP ACT, THE FOLLOWING EASEMENTS ARE HEREBY ABANDONED AND ARE NOT SHOWN HEREON: 1) 10' PUBLIC SERVICE AND UTILITY EASEMENT RECORDED FEBRUARY 6, 1970, IN BOOK 8822 OF OFFICIAL RECORDS, AT PAGE 686, SANTA CLARA COUNTY RECORDS; AND 2) 10' PUBLIC SERVICE AND UTILITY EASEMENT RECORDED APRIL 10, 1969, IN BOOK 8494 OF OFFICIAL RECORDS, AT PAGE 358, SANTA CLARA COUNTY RECORDS.

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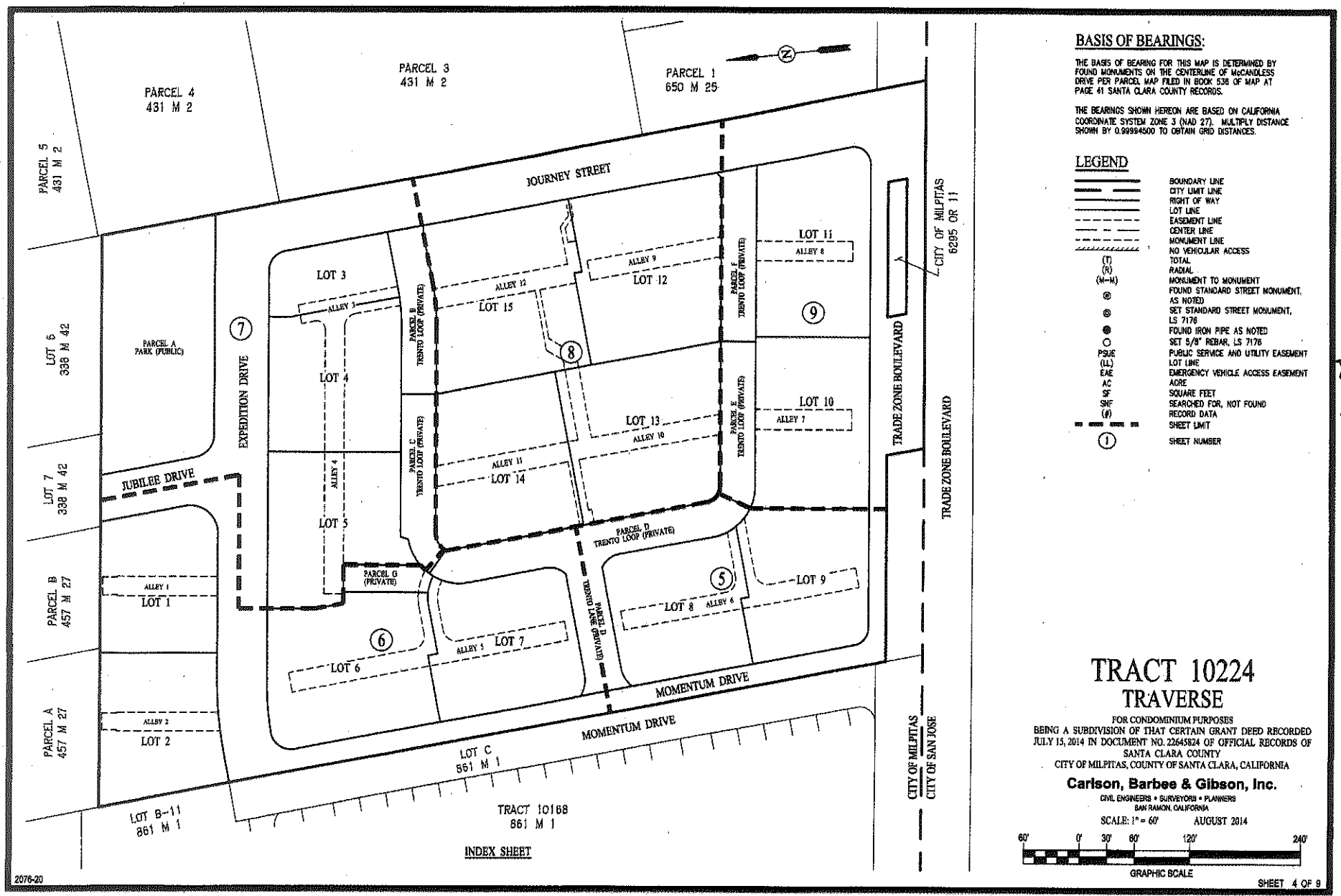

BASIS OF BEARINGS:

THE BASIS OF BEARING FOR THIS MAP IS DETERMINED BY FOUND MONUMENTS ON THE CENTERLINE OF McCANDLESS DRIVE PER PARCEL MAP FILED IN BOOK 538 OF MAP AT PAGE 41 SANTA CLARA COUNTY RECORDS.

THE BEARINGS SHOWN HEREON ARE BASED ON CALIFORNIA COORDINATE SYSTEM ZONE 3 (NAD 27). MULTIPLY DISTANCE SHOWN BY 0.99994500 TO OBTAIN GRID DISTANCES.

LEGEND

	BOUNDARY LINE
	CITY LIMIT LINE
	RIGHT OF WAY
	LOT LINE
	EASEMENT LINE
	CENTER LINE
	MONUMENT LINE
	NO VEHICULAR ACCESS
(T)	TOTAL
(R)	RADIAL
(M-M)	MONUMENT TO MONUMENT
◉	FOUND STANDARD STREET MONUMENT, AS NOTED
◎	SET STANDARD STREET MONUMENT, LS 7176
●	FOUND IRON PIPE AS NOTED
○	SET 5/8" REBAR, LS 7176
PSUE	PUBLIC SERVICE AND UTILITY EASEMENT
(LL)	LOT LINE
EAE	EMERGENCY VEHICLE ACCESS EASEMENT
AC	ACRE
SF	SQUARE FEET
SNF	SEARCHED FOR, NOT FOUND
(#)	RECORD DATA
	SHEET LIMIT
(1)	SHEET NUMBER

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CITY OF MILPITAS, COUNTY OF SANTA CLARA, CALIFORNIA

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
SAN RAMON, CALIFORNIA

SCALE: 1" = 60' AUGUST 2014

60' 0' 30' 60' 120' 240'
GRAPHIC SCALE

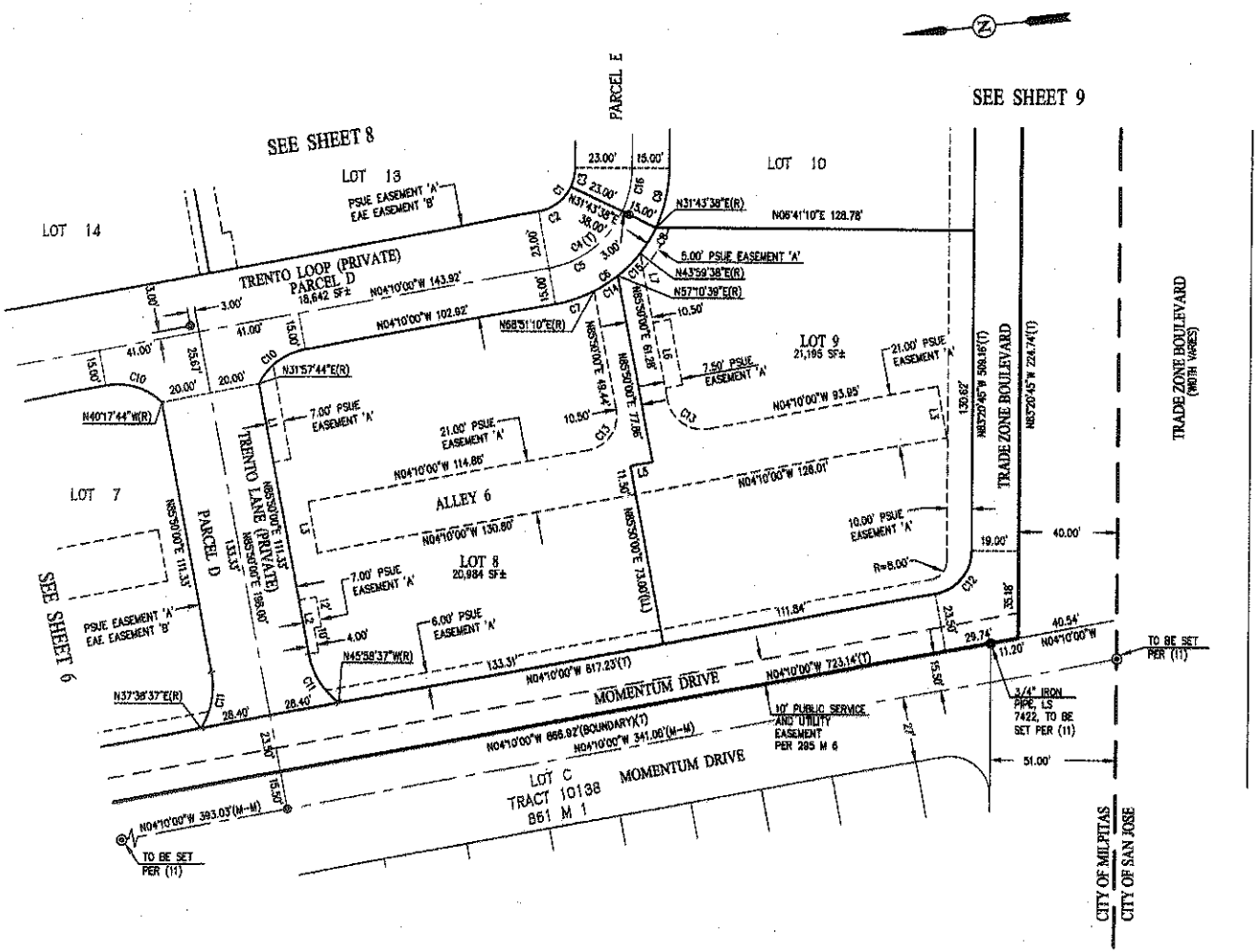
2076-20

1-242

878
1-9

4

1-242 4



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LEGEND

	BOUNDARY LINE
	CITY LIMIT LINE
	RIGHT OF WAY
	LOT LINE
	EASEMENT LINE
	CENTER LINE
	MONUMENT LINE
	NO VEHICULAR ACCESS
(T)	TOTAL
(R)	RADIAL
(M-M)	MONUMENT TO MONUMENT
⊕	FOUND STANDARD STREET MONUMENT, AS NOTED
◎	SET STANDARD STREET MONUMENT, LS 7176
●	FOUND IRON PIPE AS NOTED
○	SET 5/8" REBAR, LS 7176
PSUE	PUBLIC SERVICE AND UTILITY EASEMENT
(LL)	LOT LINE
EAE	EMERGENCY VEHICLE ACCESS EASEMENT
AC	ACRE
SF	SQUARE FEET
SNF	SEARCHED FOR, NOT FOUND
(R)	RECORD DATA

LINE TABLE		
NO	BEARING	LENGTH
L1	N85°50'00"E	32.54'
L2	N85°50'00"E	22.00'
L3	N85°50'00"E	21.00'
L5	N04°10'00"W	9.06'
L6	N85°50'00"E	27.47'
L7	N85°50'00"E	29.07'

CURVE TABLE			
NO	RADIUS	DELTA	LENGTH
C1	18.00'	79°10'45"	24.87'
C2	18.00'	54°06'22"	17.00'
C3	18.00'	25°04'23"	7.88'
C4	41.00'	79°10'45"	56.66'
C5	41.00'	54°06'22"	38.72'
C6	56.00'	54°06'22"	52.88'
C7	56.00'	28°39'21"	28.01'
C8	56.00'	25°27'01"	24.87' (LL)
C9	56.00'	25°04'23"	24.51' (LL)
C10	28.00'	53°52'16"	24.46'
C11	33.00'	41°48'37"	24.06'
C12	18.00'	79°10'45"	24.87'
C13	14.50'	90°00'00"	22.78'
C14	56.00'	11°40'31"	11.41'
C15	56.00'	13°11'01"	12.89'
C16	41.00'	25°04'23"	17.94'

TRACT 10224
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SAN RAMON, CALIFORNIA

SCALE: 1" = 30' AUGUST 2014

30' 0' 15' 30' 60' 120'
GRAPHIC SCALE

2076-20

SHEET 5 OF 9

1-242
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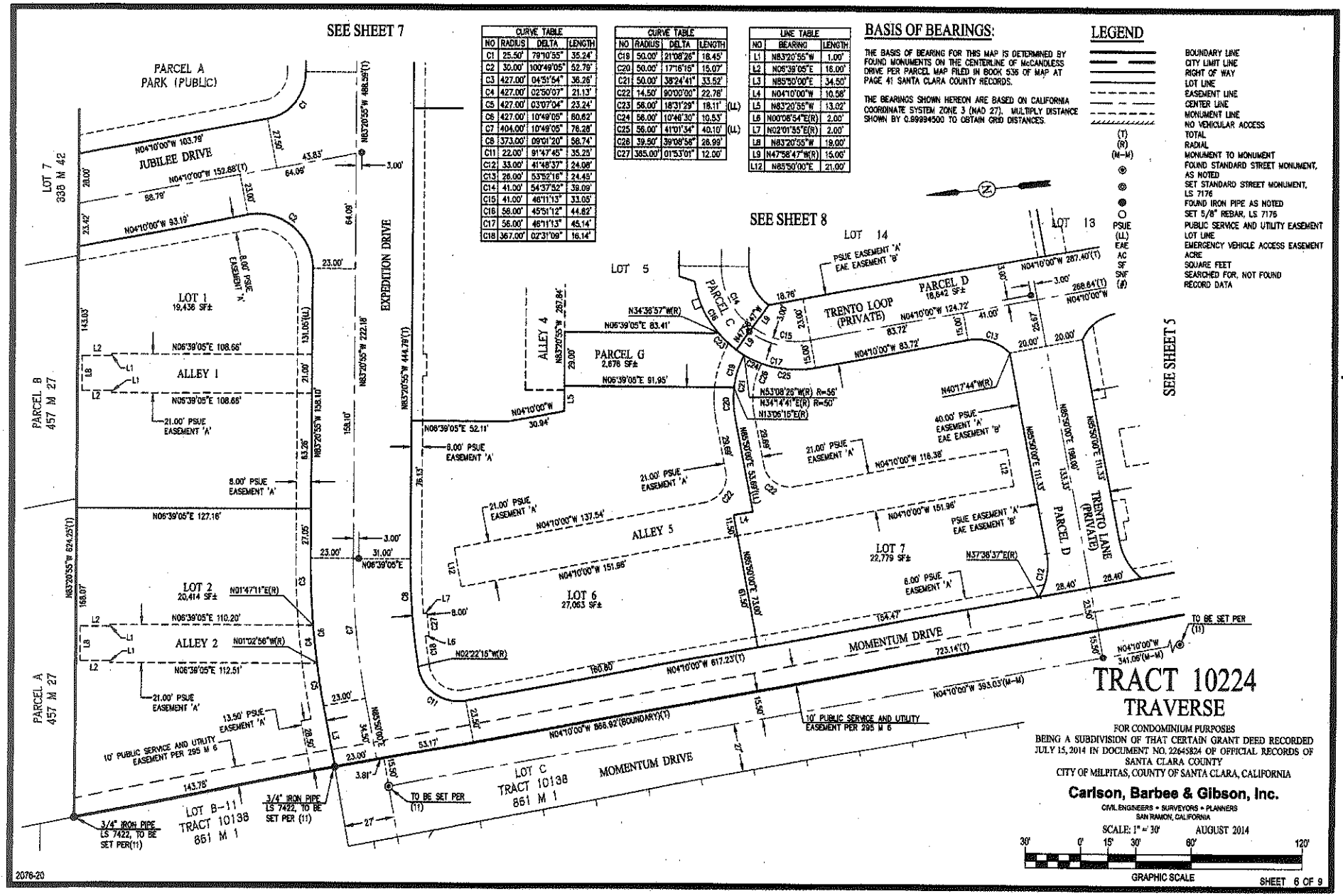
1-242 5



CURVE TABLE			
NO	RADIUS	DELTA	LENGTH
C1	25.50'	79°10'55"	35.24'
C2	30.00'	100°49'05"	52.79'
C3	427.00'	04°51'54"	36.26'
C4	427.00'	02°50'07"	21.13'
C5	427.00'	03°07'04"	23.24'
C6	427.00'	10°49'05"	80.62'
C7	404.00'	10°49'05"	76.28'
C8	373.00'	09°01'20"	58.74'
C11	22.00'	91°47'45"	35.25'
C12	33.00'	41°48'37"	24.08'
C13	26.00'	53°52'16"	24.45'
C14	41.00'	54°37'52"	39.09'
C15	41.00'	46°11'13"	33.05'
C16	56.00'	45°51'12"	44.82'
C17	56.00'	46°11'13"	45.14'
C18	367.00'	02°31'09"	16.14'

CURVE TABLE			
NO	RADIUS	DELTA	LENGTH
C19	50.00'	21°06'26"	18.45'
C20	50.00'	17°16'15"	15.07'
C21	50.00'	38°24'41"	33.52'
C22	14.50'	90°00'00"	22.78'
C23	56.00'	18°31'29"	18.11' (LL)
C24	56.00'	10°46'30"	10.53'
C25	56.00'	41°01'34"	40.10' (LL)
C26	39.50'	39°08'58"	26.99'
C27	365.00'	01°53'01"	12.00'

LINE TABLE		
NO	BEARING	LENGTH
L1	N83°20'55"W	1.00'
L2	N06°39'05"E	16.00'
L3	N85°50'00"E	34.50'
L4	N04°10'00"W	10.58'
L5	N83°20'55"W	13.02'
L6	N00°08'54"E(R)	2.00'
L7	N02°01'55"E(R)	2.00'
L8	N83°20'55"W	19.00'
L9	N47°58'47"W(R)	15.06'
L12	N85°50'00"E	21.00'

BASIS OF BEARINGS:

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LEGEND

- BOUNDARY LINE
- CITY LIMIT LINE
- RIGHT OF WAY
- LOT LINE
- EASEMENT LINE
- CENTER LINE
- MONUMENT LINE
- NO VEHICULAR ACCESS
- (T) TOTAL
- (R) RADIAL
- (M-M) MONUMENT TO MONUMENT
- FOUND STANDARD STREET MONUMENT, AS NOTED
- SET STANDARD STREET MONUMENT, LS 7176
- FOUND IRON PIPE AS NOTED
- SET 5/8" REBAR, LS 7176
- PSUE PUBLIC SERVICE AND UTILITY EASEMENT
- (LL) LOT LINE
- EAE EMERGENCY VEHICLE ACCESS EASEMENT
- AC ACRE
- SF SQUARE FEET
- SNF SEARCHED FOR, NOT FOUND
- (#) RECORD DATA

TRACT 10224
TRAVERSE

FOR CONDOMINIUM PURPOSES
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SAN RAMON, CALIFORNIA

SCALE: 1" = 30' AUGUST 2014

30' 0' 15' 30' 60' 120'
GRAPHIC SCALE

2076-20

1-242
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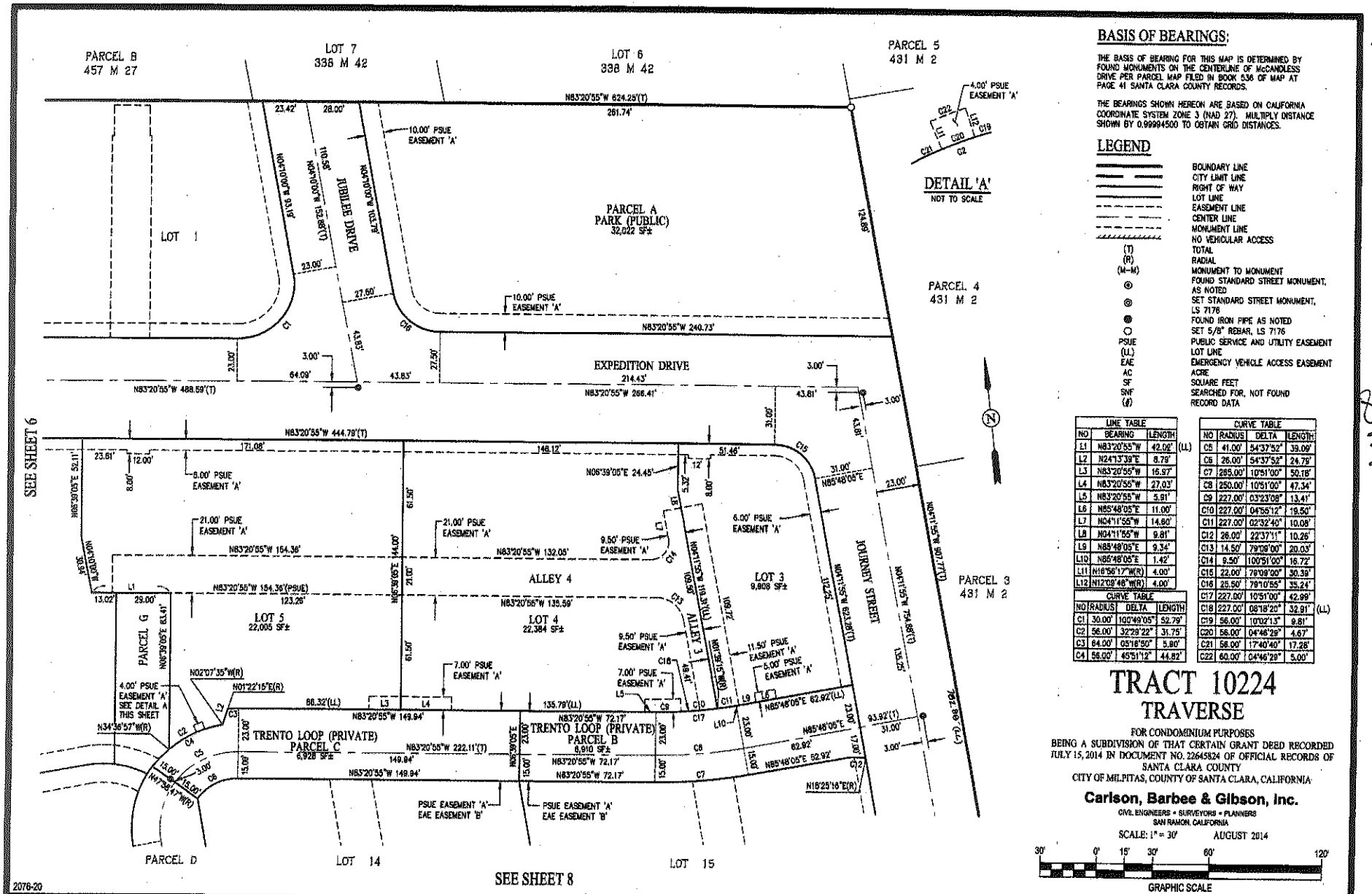

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	MONUMENT LINE
	NO VEHICULAR ACCESS
(T)	TOTAL
(R)	RADIAL
(M–M)	MONUMENT TO MONUMENT
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◎	SET STANDARD STREET MONUMENT, LS 7176
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○	SET 5/8" REBAR, LS 7176
PSUE	PUBLIC SERVICE AND UTILITY EASEMENT
(LL)	LOT LINE
EAE	EMERGENCY VEHICLE ACCESS EASEMENT
AC	ACRE
SF	SQUARE FEET
SNF	SEARCHED FOR, NOT FOUND
(#)	RECORD DATA

LINE TABLE		
NO	BEARING	LENGTH
L1	N83°20'55"W	42.09' (LL)
L2	N24°13'39"E	8.79'
L3	N83°20'55"W	16.97'
L4	N83°20'55"W	27.03'
L5	N83°20'55"W	5.91'
L6	N85°48'05"E	11.00'
L7	N04°11'55"W	14.60'
L8	N04°11'55"W	9.81'
L9	N85°48'05"E	9.34'
L10	N85°48'05"E	1.42'
L11	N16°56'17"W(R)	4.00'
L12	N12°09'48"W(R)	4.00'

CURVE TABLE			
NO	RADIUS	DELTA	LENGTH
C1	30.00'	100°49'05"	52.79'
C2	56.00'	32°29'22"	31.75'
C3	64.00'	05°16'50"	5.90'
C4	56.00'	45°51'12"	44.82'

CURVE TABLE			
NO	RADIUS	DELTA	LENGTH
C5	41.00'	54°37'52"	39.09'
C6	26.00'	54°37'52"	24.79'
C7	285.00'	10°51'00"	50.18'
C8	250.00'	10°51'00"	47.34'
C9	227.00'	03°23'08"	13.41'
C10	227.00'	04°55'12"	19.50'
C11	227.00'	02°32'40"	10.08'
C12	26.00'	22°37'11"	10.26'
C13	14.50'	79°08'00"	20.03'
C14	9.50'	100°51'00"	16.72'
C15	22.00'	79°08'00"	30.39'
C16	25.50'	79°10'55"	35.24'
C17	227.00'	10°51'00"	42.99'
C18	227.00'	08°18'20"	32.91' (LL)
C19	56.00'	10°02'13"	9.81'
C20	56.00'	04°46'29"	4.67'
C21	56.00'	17°40'40"	17.28'
C22	60.00'	04°46'29"	5.00'

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SCALE: 1" = 30' AUGUST 2014

30' 0' 15' 30' 60' 120'
GRAPHIC SCALE

1-242
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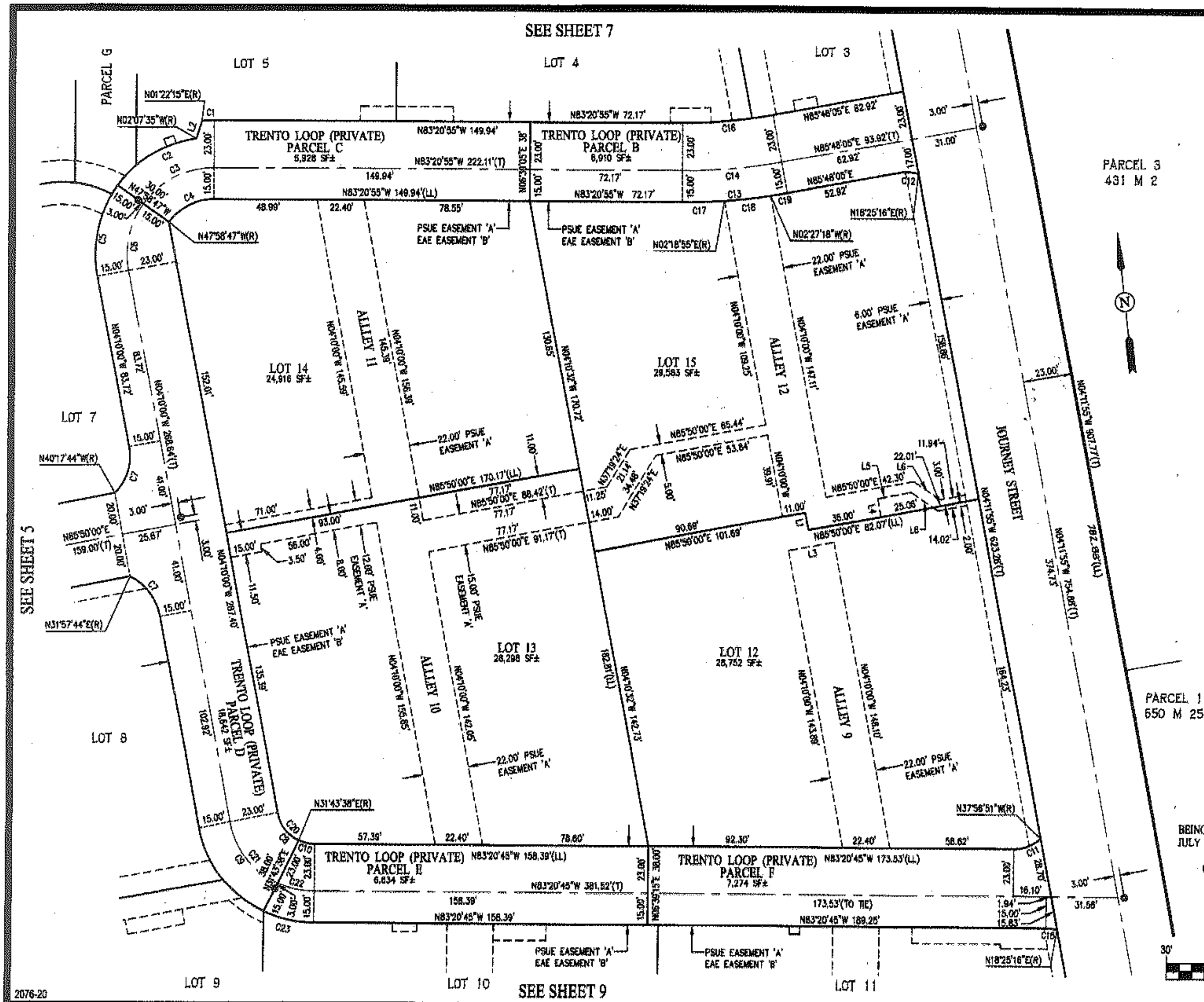
1-242



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LEGEND

━━━	BOUNDARY LINE
━ ━ ━	CITY LIMIT LINE
───	RIGHT OF WAY
───	LOT LINE
- - -	EASEMENT LINE
─ · ─	CENTER LINE
─ ─ ─	MONUMENT LINE
	NO VEHICULAR ACCESS
(T)	TOTAL
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(M-M)	MONUMENT TO MONUMENT
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(LL)	LOT LINE
EAE	EMERGENCY VEHICLE ACCESS EASEMENT
AC	ACRE
SF	SQUARE FEET
SNF	SEARCHED FOR, NOT FOUND
(#)	RECORD DATA

CURVE TABLE

NO	RADIUS	DELTA	LENGTH
C1	64.00'	05°16'50"	5.90'
C2	56.00'	45°51'12"	44.82'
C3	41.00'	54°37'52"	39.09'
C4	26.00'	54°37'52"	24.79'
C5	56.00'	46°11'13"	45.14'
C6	41.00'	46°11'13"	33.05'
C7	26.00'	53°52'16"	24.45'
C8	18.00'	54°06'22"	17.00'
C9	41.00'	79°10'45"	56.66'

LINE TABLE

NO	BEARING	LENGTH
L1	N04°10'00"W	8.36'
L2	N24°13'39"E	8.79'
L3	N85°50'00"E	22.00'
L4	N04°10'00"W	8.83'
L5	N85°50'00"E	16.23'
L6	N49°10'00"W	15.32'

CURVE TABLE

NO	RADIUS	DELTA	LENGTH
C10	18.00'	25°04'23"	7.88'
C11	18.00'	44°36'06"	14.01'
C12	26.00'	22°37'11"	10.26'
C13	265.00'	10°51'00"	50.18'
C14	250.00'	10°51'00"	47.34'
C15	26.00'	11°46'01"	5.34'
C16	227.00'	10°51'00"	42.99'
C17	265.00'	04°20'10"	20.06'
C18	265.00'	04°46'13"	22.06'
C19	265.00'	01°44'37"	8.06'
C20	18.00'	79°10'45"	24.87'
C21	41.00'	54°06'22"	38.72'
C22	41.00'	25°04'23"	17.94'
C23	56.00'	25°04'23"	24.51'

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30' 0' 15' 30' 60' 120'
GRAPHIC SCALE

878 / I-9

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1-242

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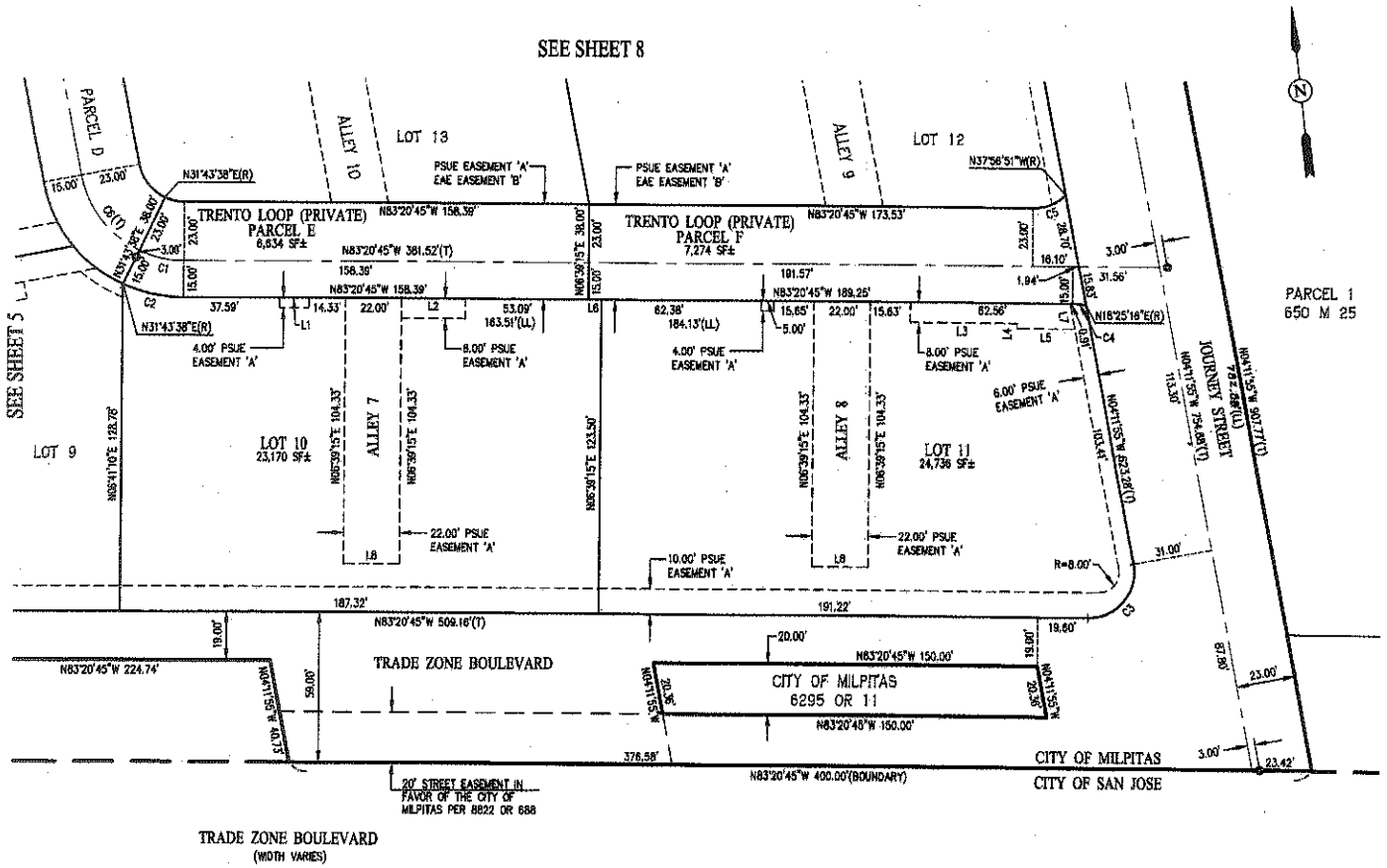

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LEGEND

	BOUNDARY LINE
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	RIGHT OF WAY
	LOT LINE
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	CENTER LINE
	MONUMENT LINE
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(T)	TOTAL
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(M-M)	MONUMENT TO MONUMENT
⊗	FOUND STANDARD STREET MONUMENT, AS NOTED
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(LL)	LOT LINE
EAE	EMERGENCY VEHICLE ACCESS EASEMENT
AC	ACRE
SF	SQUARE FEET
SNF	SEARCHED FOR, NOT FOUND
(#)	RECORD DATA

LINE TABLE		
NO	BEARING	LENGTH
L1	N83°20'45"W	11.50'
L2	N83°20'45"W	25.00'
L3	N83°20'45"W	42.00'
L4	N06°39'15"E	2.00'
L5	N83°20'45"W	22.48'
L6	N83°20'45"W	5.12'
L7	N04°11'55"W	10.18'
L8	N83°20'45"W	22.00'

CURVE TABLE			
NO	RADIUS	DELTA	LENGTH
C1	41.00'	25°04'23"	17.94'
C2	56.00'	25°04'23"	24.51'
C3	18.00'	100°51'10"	31.68'
C4	26.00'	11°46'01"	5.34'
C5	18.00'	44°36'06"	14.01'
C6	41.00'	79°10'45"	56.66'

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30' 0' 15' 30' 60' 120'
GRAPHIC SCALE

2078-20

1-242
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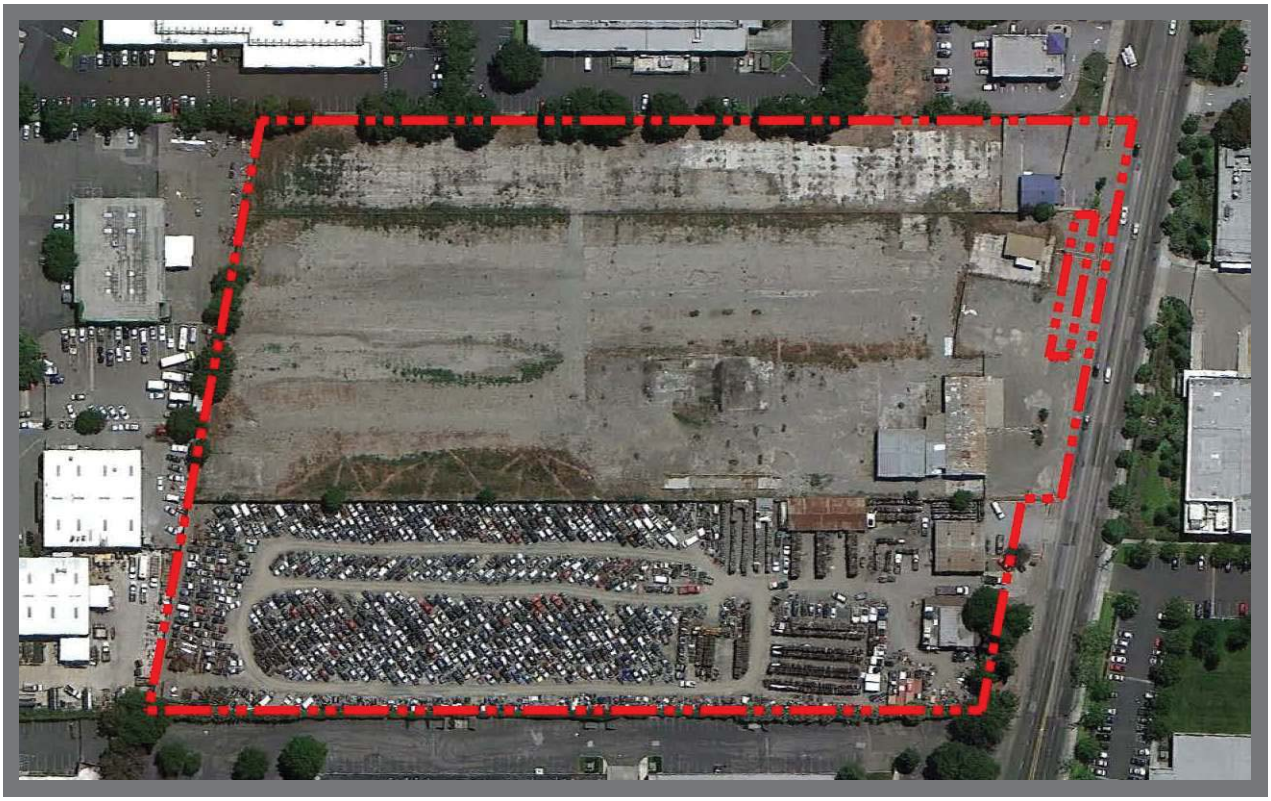
EXHIBIT B

Operation and Maintenance Plan

Stormwater Control Plan

TRAVERSE

MILPITAS, CALIFORNIA



For
Stormwater C.3 Guideline Compliance
with Traverse Improvement Plans

April 3, 2015

Prepared By:

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
2633 CAMINO RAMON, SUITE 350 • SAN RAMON, CA 94583 • (925) 866-0322 • FAX (925) 866-8575 •www.cbandg.com

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I. PROJECT SETTING

A. Project Description

This Stormwater Control Plan (SWCP) for Traverse (Project) is submitted to the City of Milpitas as an accompaniment to the Traverse Improvement Plan Submittal. The SWCP provides recommendations on the use of permanent Best Management Practices (BMP) for the proposed project. Probable design storm flows and permanent BMP selection are presented in this report. BMP technical requirements are presented in the Stormwater C.3 Guidebook 3rd edition adopted by the City of Milpitas on October 6, 2005.

The Traverse project site is located north of Trade Zone Blvd between Montague Expressway and Lundy Ave. Trade Zone Blvd. borders the site to the south. On the north and east, the project is bordered by existing industrial buildings. The approved development project currently called Pace and associated Momentum Drive borders the project site to the west. The project site is shown in Figure 1. An aerial of the site is provided in Figure 2. The improvements to the 12.5± acre site will include 29 multi-story buildings, public and private roadways, a public park, private common areas, and landscaped paseos.

B. Site Features and Conditions

Existing Conditions

The existing site is located in an area currently used for industrial purposes and contains several small buildings and associated hardscape. Elevations range from approximately 45 feet near the southeast corner of the site and to approximately 37 feet at the northwestern-most corner of the site. The existing buildings, paving, concrete, and other impervious surfaces account for approximately 24% (3 ac) of the site. The remaining 76% of the site are pervious surfaces consisting of minimal landscaped areas along Trade Zone Blvd. frontage and large dirt lots. All existing surface improvements will be demolished as part of the project.

The existing surface type and corresponding areas are shown in Table 1 and the existing conditions and storm drain lines are identified in Figure 3.

Proposed Conditions

The SWCP has studied and designed the BMP's for the ultimate improvements. Upon construction of the proposed improvements, approximately 9.1 acres (73%) of the site will be covered by impervious surface and about 3.4 acres (27%) will be covered by landscaped areas including lawns, shrubs, and trees. All walkways within these areas will be sloped to drain onto the surrounding landscaping. The Proposed Conditions are shown in Figure 4.

The proposed surface type and corresponding areas are shown in Table 2 and the proposed conditions and storm drain lines are identified in Figure 4.

The proposed on-site drainage system will consist of five principle drainage areas:

- *Drainage Area 'A'* – Approximately 0.8 acres on Trade Zone Blvd. will discharge into the existing storm drain line in Trade Zone Blvd. This area will be treated through flow-through planters before entering the storm drain system.

- *Drainage Area 'B'* – Approximately 0.3 acres on the western frontage. This portion of roadway associated with this project will widen the existing Momentum Drive constructed with the Pace project, and will add parking bays, landscape strip, and sidewalk. This drainage area will be treated through flow-through planters which will connect to the existing storm drain system.

- *Drainage Area 'C'* – Approximately 1.6 acres of the proposed Momentum Drive and the Public Park. These areas will be treated via several flow-through planters which will then be connected to this storm drain system.

- *Drainage Area 'D'* – Approximately 0.8 acres on the eastern frontage will be a new public road. There is an existing storm drain line along this frontage. This roadway drainage will be directed to several flow-through planters which will then be connected to this system.

- *Drainage Area 'E'* – Approximately 8.1 acres of the private "center" of the site will discharge into the existing storm drain system in the existing Momentum Drive. This drainage will be treated through a variety of measures onsite before entering the public system in Momentum Drive.

- *Drainage Area 'F'* – Approximately 0.9 acres of the most northwest corner of the site will discharge into the existing storm drain system in Momentum Drive as well. This drainage will be treated through a variety of measures onsite before entering the public system in Momentum Drive.

The proposed on-site storm drainage system improvements for the site will tie into several existing storm drain systems as shown in Figure 4.

C. Opportunities and Constraints for Stormwater Control

Opportunities

- *Landscape Areas* – Landscape areas in front and sides of the buildings provide and opportunity for treatment through biotreatment using flow-through planters. These planters provide an opportunity to collect and treat adjacent roof areas. These planters will be incorporated into the landscape design to provide appropriate vegetation and treatment.

- *Self-Treating/Self-Retaining Areas* – Landscape areas adjacent to sidewalks and other impervious areas provide a treatment option. Drainage from sidewalks that is directed to landscape areas provides treatment options for evapotranspiration and infiltration.

Constraints

- *High Density Land Use* – The site will be largely covered by rooftops and paving with limited open space for use of storm water control and site aesthetics (i.e. landscaping).
- *Existing Site* – The existing topography and utility improvements make use of open space areas for stormwater treatment difficult.
- *Existing Streets* – In combination of the existing topography, the existing Momentum Drive and Trade Zone Blvd. limit the storm water treatment options.
- *Shallow Utility* – Existing Utility depths are very shallow thus limiting options for treatment of storm water. Directing stormwater to a treatment feature and then directing it into the City system becomes a challenge.

D. Hydromodification Management Requirements

The project site is within the area defined as greater than 65% imperviousness and greater than 90% build-out as shown on the Areas of Applicability Map (Attachment B, Appendix P) of the Milpitas Stormwater C.3 Guidebook. Projects in this area are exempt from the Hydromodification Management Plan requirements.

E. Infiltration and Rainwater Harvesting Feasibility

This project will be extending the existing recycled water main in Momentum Drive up through Expedition Drive for irrigating landscape areas throughout the project. Therefore, further analysis on the feasibility of infiltration and rainwater harvesting is not required. See Appendix B for the completed Infiltration and Rainwater Harvesting Infeasibility worksheet.

F. Special Project Eligibility

This project is not subject to LID treatment reduction credits and will treat 100% of the stormwater using LID methods.

II. MEASURES TO LIMIT IMPERVIOUSNESS

A. Measures to Cluster Development and Protect Natural Resources

The proposed project was planned with water quality treatment goals at the forefront. Every effort will be made to minimize impervious surfaces and redirect runoff to less pervious surfaces. The Stormwater Control Plan has identified the following design strategies which will aid in achieving these goals.

- The site incorporates 206 residential units into 29 multi-story buildings with two car garages for each unit. This limits the amount of impervious area that may otherwise be found with on-street parking spaces. Surface parking is provided as necessary to meet City Requirement's without providing excess impervious surface.
- A minimum of two buildings share one alley driveway to limit pavement associate with the project.
- Continuous landscape corridors promote pedestrian access throughout the project.
- Minimal width sidewalks provide pedestrian access while maximizing pervious landscape areas.
- Directing sidewalks to landscape areas to promote "Self-Treatment" in the landscape areas.

B. Measures to Limit Directly Connected Impervious Areas

The proposed site layout and building locations offer the possibility of directing stormwater runoff to proposed landscape areas.

Approximately 3.4 acres (27%) of the proposed project will be covered by landscaped or pervious surfaces which include lawn, shrubs, and trees.

- The project shall be designed to direct runoff from impervious surfaces into landscape areas or a drainage treatment feature where possible, i.e. Flow Through Planters.
- Pedestrian pathways within the landscape areas such as the paseos shall be sloped to drain towards adjacent landscape areas, i.e. Self-Retaining Areas.

C. Selection of Paving Materials

Conventional concrete and asphalt have been selected for use throughout this site.

Where possible, pervious surfaces will be used. These may include: pervious concrete, pervious concrete gutters & valley gutters, etc.

III. SELECTION AND DESIGN OF STORMWATER TREATMENT BMP'S

A. Hydrology

Runoff coefficients for existing and proposed on-site conditions were based on the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), See Table 2. The City of Milpitas Land Development Engineering Manual values were not surface type specific and therefore not used.

A rainfall intensity value of *0.2 inches per hour* is used for treatment flows based on the City of Milpitas Stormwater C.3 Guidebook. The weighted runoff coefficient was based on the percentage of the impervious or pervious area for all area classifications in the tributary drainage area.

B. Recommended Permanent BMP's

This SWCP has identified a combination of biotreatment, Figure 5 & 8 (flow-through planters), infiltration, Figure 7 (pervious gutter pans, pervious valley gutters), and landscape treatment, Figure 6 (self-treating, self-retaining) as the best methods to fulfill on-site treatment requirements. The drainage areas to be treated by each method are shown in Figures 5, 6, 7, and 8 as indicated above. These BMP's will provide a level of treatment that meets the C.3 requirements for the runoff generated by the project improvements:

- Selected landscaping areas can be used as biotreatment BMP's. Where applicable, adjacent roof runoff will be directed to landscape areas. Figure 5 identifies landscape areas that will be used for biotreatment. Figure 8 identifies flow-through planters areas that will be used to treat runoff from public streets. Figure 9 is a typical Flow-Through Planter detail for on-site treatment, and Figure 10 is a typical detail for Flow-Through Planter detail for planters within the public right of way.

- Private Street stormwater will be treated through infiltration under the proposed gutter pan and valley gutters. The street and monolithic sidewalk drainage will flow through the pervious gutter and into an infiltration storage area. A subdrain will be placed at the top of the storage area to direct the overflow to the nearest catch basin and into the storm drain system. See Figure 7 for proposed roadway infiltration areas. Figure 11 shows the typical detail for the pervious gutter to be used on Trento Loop and Trento Lane. Where on-site parking bays occur, the detail on Figure 12 will be used, which shows the typical detail for the pervious valley gutter.

- Stormwater from the private alleys and building drainage will be treated through infiltration under the proposed valley gutter in the center of the alley. The drainage will flow through the pervious concrete and into an infiltration storage area. A subdrain will be placed at the top of the storage area to direct the overflow to the nearest catch basin and into the storm drain system. See Figure 7 for proposed drainage areas to be treated in the previous valley gutter. Figure 13 shows the typical detail for the pervious valley gutter.

- Site sidewalks and detached street sidewalks will be directed to landscape areas for treatment. These landscape areas are qualified as Self-Retaining Treatment. Figure 6 indicates the Self-Treating and Self-Retaining areas and the sidewalks that are treated in these landscape areas.

Maintenance procedures for the recommended BMP's are outlined in Section VI, BMP Maintenance Requirements.

Biotreatment

Biotreatment areas are designed to filter pollutants from stormwater runoff from adjacent roof areas, streets, and alleys (see Figure 5 & 8). These features include Flow-Through Planters (see Figure 9 and Figure 10). These features use a varied combination of vegetated buffers, ponding areas, permeable planting soils, infiltration materials and subdrain systems. Stormwater planters will collect and treat building roof areas as shown on Figure 5 and public street areas as shown on Figure 8. Once the water infiltrates through the bio-filtration material, it is collected and directed to the main public storm drain system.

The sizing of the biotreatment areas will be done to maximize treatment for tributary areas. Runoff that is directed into the biotreatment area will infiltrate through a specified infiltration mixture. The infiltration material to be used within the treatment areas must have a minimum infiltration rate of 5 inches per hour to meet the specification described in Appendix C of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) C.3 Stormwater Handbook.

Sizing of the biotreatment areas is calculated using a combination flow and volume method as stated in the Municipal Regional Stormwater NPDES permit. All of these flow-through planters were sized to have a 4" maximum ponding depth. Each flow-through planter is equipped with an overflow structure that will direct excess water directly into the drainage system. The grate of the overflow structure will be set above the required ponding height to meet the minimum volume requirements for each biotreatment area. See Table 3 for flow-through calculations and dimensions.

Infiltration

Infiltration is the preferred method of Stormwater Treatment as identified by SCVURPPP. Infiltration is designed to filter pollutants from stormwater runoff from impervious areas through infiltration of the drainage through the native soils. The project will have several infiltration methods: pervious gutters and pervious valley gutters. The pervious gutters and pervious valley gutters will collect and direct drainage over the required treatment volume into the storm drain system. See Figure 7 for the drainage areas for the pervious valley gutter and pervious gutter pan.

The site's soils allow infiltration to be a feasible method of stormwater treatment. The in-place soils have been remediated, sampled, and deemed clean. By infiltrating into these soils, groundwater quality is not at risk. In addition, the infiltration rate of the soils is adequate for the proposed treatment methods, and a 72 hour drawdown is anticipated. For more information regarding the site's soil conditions, see geotechnical recommendations in Appendix K and Appendix L.

Sizing of infiltration areas is done using the Urban Runoff Quality Management Approach (URQM) per the SCVURPPP Stormwater Handbook Appendix B. In Appendix F of this report, there is a sample calculation of the URQM form for the infiltration areas within a typical street section and a typical alley.

For the pervious gutter pan, there is a sample calculation (URQM) in Appendix F using a 1 foot section of typical roadway. By analyzing a 1 foot section, a typical detail can be designed for the gutter section. The worksheets in Appendix F yield a required volume to treat. This required volume is then applied to a 1' section to determine the required dimensions (see Sample Calculations in Appendix F). Figure 11 provides the details for the pervious gutter.

To determine a typical section for the pervious valley gutter, the largest drainage area was used. This "worst case scenario" was used to determine a required treatment volume (see Typical Alley Sizing worksheet in Appendix F). This required treatment volume is to be treated within the pervious drain rock section under the valley gutter. A sample calculation is shown in Appendix F to show how a typical section is designed based off the required treatment volume. Figure 13 provides the details for the pervious valley gutter for use in the alleys.

Drainage Areas

Proposed Drainage Area 'A'

Proposed Drainage Area 'A' includes approximately 0.8 acres of Trade Zone Blvd. This drainage area will be treated by biotreatment planters located behind the top of curb in what would otherwise be landscaping areas. Curb-cuts will allow runoff to enter the bioretention areas.

- Flow-Through Planter (as shown in Figures 8)

Proposed Drainage Area 'B'

Proposed Drainage Area 'B' includes approximately 0.3 acres of roadway widening for Momentum Drive. The existing street slopes towards the west curb where drainage is collected and directed to a manhole treatment structure at the north end of Momentum Drive. The proposed improvements will add parking, landscaping, and sidewalks. These improvements are to be treated through LID measures (and cannot be treated via the existing manhole treatment filter). Bioretention pockets located between parking bays will treat runoff associated with the added improvements. Curb-cuts will allow runoff to enter the bioretention areas.

- Flow-Through Planter (as shown in Figures 8 and 10)

Proposed Drainage Area 'C'

Proposed Drainage Area 'C' includes approximately 1.6 acres of public roadway and detached sidewalk where the proposed Park will be. This drainage area will be treated by biotreatment planters located behind the top of curb in what would otherwise be landscaping areas. Curb-cuts will allow runoff to enter the bioretention areas.

- Flow-Through Planter (as shown in Figures 8 and 10)

Proposed Drainage Area 'D'

Proposed Drainage Area 'D' includes approximately 0.8 acres of public roadway and detached sidewalk. This drainage area will be treated by biotreatment planters located behind the top of curb in what would otherwise be landscaping areas. Curb-cuts will allow runoff to enter the bioretention areas.

- Flow-Through Planter (as shown in Figures 8 and 10)

Proposed Drainage Area 'E'

Proposed Drainage Area 'E' includes approximately 8.1 acres of private roadway, alleys, sidewalk, landscaping and buildings. This drainage area will be treated by a variety of methods. Self-treating and Self-retaining areas will treat the landscape and site and detached sidewalks. Building runoff that is directed to the landscape areas will be treated by flow-through planters. Private roadways, alleys and roof runoff directed to the alleys will be treated by pervious gutters in the streets pervious valley gutters in the alleys.

- Flow-Through Planters – Building Runoff (as shown in Figure 5 and Figure 9)
- Pervious Concrete Gutter Infiltration – Private Streets (see Figure 7 and Figure 11)
- Pervious Concrete Valley Gutter Infiltration – Private Streets (see Figure 7 and Figure 12)
- Pervious Concrete Valley Gutter Infiltration – Alleys (see Figure 7 and Figure 13)
- Self-Treating & Self-Retaining Areas - Landscape and Sidewalks (see Figure 6)

Proposed Drainage Area 'F'

Proposed Drainage Area 'F' includes approximately 0.9 acres of private roadway, alleys, sidewalk, landscaping and buildings. This drainage area will be treated by a wide variety of methods. Self-treating and Self-retaining areas will treat the landscape and site and detached sidewalks. Building runoff that is directed to the landscape areas will be treated by flow-through planters. Private roadways, alleys and roof runoff directed to the alleys will be treated by pervious gutters in the streets pervious valley gutters in the alleys.

- Flow-Through Planters – Building Runoff (as shown in Figure 5 and Figure 9)
- Pervious Concrete Valley Gutter Infiltration – Alleys (see Figure 7 and Figure 13)
- Self-Treating & Self-Retaining Areas - Landscape and Sidewalks (see Figure 6)

IV. SOURCE CONTROL MEASURES

A. Permanent Source Control BMP's

- *On-Site Drain Inlets* – On-site inlets will be impressed with "NO DUMPING-DRAINS TO BAY."

- *Landscape / Outdoor Pesticide Use* – Landscaping will be designed to minimize required irrigation and runoff, to promote surface infiltration, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. Where possible, pest-resistant plants will be selected, especially for locations adjacent to hardscape. Plants will be selected appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.

- *Fire Sprinkler Test Water* – Sanitary sewer connections shall be provided to drain fire sprinkler test water

- *Refuse Areas* – New structures shall provide a covered or enclosed area for dumpsters. The area shall be designed to prevent water run-on to the area and run-off from the area.

- *Regular Street Sweeping* – Routine street sweeping should be conducted to remove debris and ensure permeability of pervious concrete.

B. Operational Source Control BMP's

- *On-site Drain Inlets* – Inlet markings will be inspected annually and replaced or renewed as needed.

- *Private Streets* – Owner of private streets and storm drains shall prepare and implement a plan for street sweeping of paved private roads and cleaning of all storm drain inlets.

- *Vehicle and Equipment Cleaning* – Residential CC&R's will prohibit maintenance, repair, or cleaning of vehicles or other equipment on site.

- *Paved Sidewalks and Parking Lots* – Sidewalks and parking lots shall be swept regularly to prevent the accumulation of litter and debris.

- *Landscape / Outdoor Pesticide Use* – All on-site landscaping is to be privately maintained by the property owner using Integrated Pest Management (IPM) principles, with minimal or no use of pesticides.

V. PERMITTING AND CODE COMPLIANCE ISSUES

There are no known conflicts between the proposed Stormwater Control Plan and the City of Milpitas ordinances and policies. Any conflicts that are found will be resolved through the design review process or during subsequent permitting.

VI. BMP MAINTENANCE REQUIREMENTS

A. Recommended BMP Maintenance

Proper operation and maintenance of stormwater management facilities will be the responsibility of the property owner in perpetuity. The property owner will be subject to an annual fee (set by the City's standard fee schedule) to offset the cost of inspecting the site or verifying that the stormwater management facilities are being maintained.

The applicant will prepare and submit, for the City's review, an acceptable Stormwater Control Operation and Maintenance Plan prior to the completion of construction and will execute a Stormwater Management Facilities Operation and Maintenance Agreement before sale, transfer, or permanent occupancy of the site. The applicant accepts the responsibility for maintenance of stormwater management facilities until such responsibility is transferred to another entity.

Treatment BMP's require minimum maintenance similar to that for any landscape areas. BMP's must be regularly maintained to insure that they continue to be effective and do not cause flooding or other harmful nuisances. The maintenance requirements are:

<u>Biotreatment</u>

- Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.
- Replace and amend plants and soils as necessary to insure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.
- Visually inspect for ponding water to ensure system is functional.
- After all major storm events remove trash, inspect drain pipes and bubble-up risers for obstructions and remove if necessary.
- Continue general landscape maintenance, including pruning and cleanup throughout the year.
- Irrigate throughout the dry season. Irrigation will be provided with sufficient quantity and frequency to allow plants to thrive.
- Excavate, clean and or replace filter media (bio-treatment soil mix) to insure adequate infiltration rate (10 years or as needed).

<u>Pervious Concrete (Gutter, Valley Gutters, etc.)</u>

- Regular sweeping of pervious surfaces to remove large debris.
- Annual pressure washing of pervious surfaces.
- Visually inspect infiltration areas for ponding water or physical distress to ensure system is functional.

Landscape Areas (Self-Treating, Self-Retaining, etc.)

- Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.
- Replace and amend plants and soils as necessary to insure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.
- After all major storm events remove trash and inspect drain pipes obstructions and remove if necessary.
- Continue general landscape maintenance, including pruning and cleanup throughout the year.
- Irrigate throughout the dry season. Irrigation will be provided with sufficient quantity and frequency to allow plants to thrive.

Appendix A

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

PROVISION C.3 DATA FORM

Which Projects Must Comply with Stormwater Requirements?

All projects that create and/or replace **10,000 sq. ft.** or more of impervious surface on the project site must fill out this worksheet and submit it with the development project application.

All restaurants, auto service facilities, retail gasoline outlets, and uncovered parking lot projects (stand-alone or part of another development project, including the top uncovered portion of parking structures) that create and/or replace **5,000 sq. ft.** or more of impervious surface on the project site must also fill out this worksheet.

Interior remodeling projects, routine maintenance or repair projects such as re-roofing and re-paving, and single family homes that are not part of a larger plan of development are **NOT** required to complete this worksheet.

What is an Impervious Surface?

An impervious surface is a surface covering or pavement that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to rooftops, walkways, paved patios, driveways, parking lots, storage areas, impervious concrete and asphalt, and any other continuous watertight pavement or covering. Pervious pavement, underlain with pervious soil or pervious storage material (e.g., drain rock), that infiltrates rainfall at a rate equal to or greater than surrounding unpaved areas OR that stores and infiltrates the water quality design volume specified in Provision C.3.d of the Municipal Regional Stormwater Permit (MRP), is not considered an impervious surface.

For More Information

For more information regarding selection of Best Management Practices for stormwater pollution prevention or stormwater treatment contact:_____

1. Project Information

Project Name: TRAVERSE **APN #** 086-36-003, -004, -005, -006

Project Address: 569/595/615/625 TRADE ZONE BLVD

Cross Streets:

Applicant/Developer Name: K Hovnanian Homes

Project Phase(s): 1 **of** 1 **Engineer:** CARLSON, BARBEE & GIBSON

Project Type (Check all that apply): ☐ New Development ☒ Redevelopment

☒ Residential ☐ Commercial ☐ Industrial ☐ Mixed Use ☐ Public ☐ Institutional

☐ Restaurant ☐ Uncovered Parking ☐ Retail Gas Outlet ☐ Auto Service (SIC code)_____
(5013-5014, 5541, 7532-7534, 7536-7539)

☐ Other _____

Project Description: 206 UNIT MULTI-FAMILY RESIDENTIAL

Project Watershed/Receiving Water (creek, river or bay): LOWER PENITENCIA WATERSHED

2. Project Size

a. Total Site Area: 12.5 acre	b. Total Site Area Disturbed: 12.5 acre (including clearing, grading, or excavating)			
	Existing Area (ft^2)	Proposed Area (ft^2)		Total Post-Project Area (ft^2)
		Replaced	New	
Impervious Area				
Roof			146,820	146,820
Parking				
Sidewalks and Streets			212,910	212,910
c. Total Impervious Area	130,680		359,730	359,730
d. Total new and replaced impervious area		359,730		
Pervious Area				
Landscaping	413,820		184,770	184,770
Pervious Paving				
Other (e.g. Green Roof)				
e. Total Pervious Area	413,820		184,770	184,770
f. Percent Replacement of Impervious Area in Redevelopment Projects (Replaced Total Impervious Area ÷ Existing Total Impervious Area) x 100% = 275 %				

3. State Construction General Permit Applicability:

a. Is #2.b. equal to 1 acre or more?

☒ Yes, applicant must obtain coverage under the State Construction General Permit (i.e., file a Notice of Intent and prepare a Stormwater Pollution Prevention Plan) (see www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml for details).

☐ No, applicant does not need coverage under the State Construction General Permit.

4. MRP Provision C.3 Applicability:

a. Is #2.d. equal to **10,000** sq. ft. or more, or **5,000** sq. ft. or more for restaurants, auto service facilities, retail gas outlets, and uncovered parking?

*(*Note that for public projects, the 5,000 sq. ft. threshold does not take effect until 12/1/12.)*

☒ Yes, C.3. source control, site design and treatment requirements apply

☐ No, C.3. source control and site design requirements may apply – check with local agency

b. Is #2.f. equal to 50% or more?

☒ Yes, C.3. requirements (site design and source control, as appropriate, and stormwater treatment) apply to entire site

☐ No, C.3. requirements only apply to impervious area created and/or replaced

5. Hydromodification Management (HM) Applicability:

a. Does project create and/or replace one acre or more of impervious surface AND is the total post-project impervious area greater than the pre-project (existing) impervious area?

☒ Yes (continue) ☐ No – exempt from HM, go to page 3

b. Is the project located in an area of HM applicability (green area) on the HM Applicability Map? (www.scvurppp-w2k.com/hmp_maps.htm)

☐ Yes, project must implement HM requirements

☒ No, project is exempt from HM requirements

6. Selection of Specific Stormwater Control Measures:

Site Design Measures

- ☐ Minimize land disturbed
- ☒ Minimize impervious surfaces
- ☐ Minimum-impact street or parking lot design
- ☒ Cluster structures/ pavement
- ☒ Disconnected downspouts
- ☒ Pervious pavement
- ☐ Green roof
- ☐ Microdetention in landscape
- ☒ Other self-treating area
- ☒ Self-retaining area
- ☐ Rainwater harvesting and use (e.g., rain barrel, cistern connected to roof drains) [1]
- ☐ Preserved open space: _____ ac. or sq. ft .(circle one)
- ☐ Protected riparian and wetland areas/buffers (Setback from top of bank: _____ft.)
- ☐ Other _____

Source Control Measures

- ☐ Alternative building materials
- ☐ Wash area/racks, drain to sanitary sewer[2]
- ☐ Covered dumpster area, drain to sanitary sewer[2]
- ☒ Sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain[2]
- ☒ Beneficial landscaping (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment)
- ☐ Outdoor material storage protection
- ☐ Covers, drains for loading docks, maintenance bays, fueling areas
- ☒ Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)
- ☒ Storm drain labeling
- ☐ Other _____

Treatment Systems

- ☐ None (all impervious surface drains to self-retaining areas)

LID Treatment

- ☐ Rainwater harvest and use (e.g., cistern or rain barrel sized for C.3.d treatment)
- ☐ Infiltration basin
- ☐ Infiltration trench
- ☐ Exfiltration trench
- ☒ Underground detention and infiltration system (e.g. pervious pavement drain rock, large diameter conduit)

Biotreatment [3]

- ☐ Bioretention area
- ☒ Flow-through planter
- ☐ Tree box with bioretention soils
- ☐ Other _____

Other Treatment Methods

- ☐ Proprietary tree box filter[4]
- ☐ Media filter (sand, compost, or proprietary media)[4]
- ☐ Vegetated filter strip[5]
- ☐ Dry detention basin[5]
- ☐ Other _____

Flow Duration Controls for Hydromodification Management (HM)

- ☐ Detention basin
- ☐ Underground tank or vault
- ☐ Bioretention with outlet control
- ☐ Other _____

[1] Optional site design measure; does not have to be sized to comply with Provision C.3.d treatment requirements.
[2] Subject to sanitary sewer authority requirements.
[3] Biotreatment measures are allowed only with completed feasibility analysis showing that infiltration and rainwater harvest and use are infeasible.
[4] These treatment measures are only allowed if the project qualifies as a "Special Project".
[5] These treatment measures are only allowed as part of a multi-step treatment process.

7. Treatment System Sizing for Projects with Treatment Requirements

Indicate the hydraulic sizing criteria used and provide the calculated design flow or volume:

Treatment System Component	Hydraulic Sizing Criteria Used[3]	Design Flow or Volume (cfs or cu.ft.)
Flow-Through Planters	3	CF
Infiltration Valley Gutter/Gutter Pan	1B	CF

[3]Key: 1a: Volume – WEF Method
1b: Volume – CASQA BMP Handbook Method
2a: Flow – Factored Flood Flow Method
2b: Flow – CASQA BMP Handbook Method
2c: Flow – Uniform Intensity Method
3: Combination Flow and Volume Design Basis

8. Alternative Certification: Was the treatment system sizing and design reviewed by a qualified third-party professional that is not a member of the project team or agency staff?

☒ Yes ☐ No Name of Reviewer ENGEO

9. Operation & Maintenance Information

A. Property Owner's Name K Hovnanian Homes

B. Responsible Party for Stormwater Treatment/Hydromodification Control O&M:

a. Name: K Hovnanian Homes

b. Address: 1375 Exposition Blvd, Suite 300, Sacramento, CA 95815

c. Phone/E-mail: (916) 349-4051

This section to be completed by Municipal staff.

O&M Responsibility Mechanism

Indicate how responsibility for O&M is assured. Check all that apply:

☐ O&M Agreement

☐ Other mechanism that assigns responsibility (describe below):

_____

_____

Reviewed:

Community Development Department

Planning Division: _____

Building Division: _____

Return form to: _____

Public Works Department

Engineering: _____

Other (Specify): _____

Data entry performed by: _____

Appendix B

Infiltration/Harvesting and Use Feasibility Screening Worksheet

Apply these screening criteria for C.3 Regulated Projects required to implement Provision C.3 stormwater treatment requirements. See the Glossary (Attachment 1) for definitions of terms marked with an asterisk (*). Contact municipal staff to determine whether the project meets Special Project* criteria. If the project meets Special Project criteria, it may receive LID treatment reduction credits.*

1. Applicant Info

Site Address: 569/595/615/625 Trade Zone Blvd , CA APN: 086-36-003/4/5/6

Applicant Name: K Hovnanian Homes Phone No.: (916) 349-4051

Mailing Address: 1375 Exposition Blvd, Suite 300, Sacramento, CA 95815

2. Feasibility Screening for Infiltration

Do site soils either (a) have a saturated hydraulic conductivity* (Ksat) that will NOT allow infiltration of 80% of the annual runoff (that is, the Ksat is LESS than 1.6 inches/hour), or, if the Ksat rate is not available, (b) consist of Type C or D soils?[1]

☑ Yes (continue) ☐ No – complete the Infiltration Feasibility Worksheet. If infiltration of the C.3.d amount of runoff is found to be feasible, there is no need to complete the rest of this screening worksheet.

3. Recycled Water Use

Check the box if the project is installing and using a recycled water plumbing system for non-potable water use.

☑ The project is installing a recycled water plumbing system, and installation of a second non-potable water system for harvested rainwater is impractical, and considered infeasible due to cost considerations. Skip to Section 6.

4. Calculate the Potential Rainwater Capture Area* for Screening of Harvesting and Use

Complete this section for the entire project area. If rainwater harvesting and use is infeasible for the entire site, and the project includes one or more buildings that each have an individual roof area of 10,000 sq. ft. or more, then complete Sections 4 and 5 of this form for each of these buildings.

4.1 Table 1 for (check one): ☑ The whole project ☐ Area of 1 building roof (10,000 sq.ft. min.)

Table 1: Calculation of the Potential Rainwater Capture Area*

The Potential Rainwater Capture Area may consist of either the entire project area or one building with a roof area of 10,000 sq. ft. or more.

	1	2	3	4
	Pre-Project Impervious surface[2] (sq.ft.), if applicable	Proposed Impervious Surface[2] (IS), in sq. ft.		Post-project landscaping (sq.ft.), if applicable
		Replaced[3] IS	Created[4] IS	
a. Enter the totals for the area to be evaluated:	130,680		359,730	184,770
b. Sum of replaced and created impervious surface:	N/A	359,730		N/A
c. Area of existing impervious surface that will NOT be replaced by the project.	0	N/A		N/A

[1] Base this response on the site-specific soil report, if available. If this is not available, consult soil hydraulic conductivity maps in Attachment 3.

[2], Enter the total of all impervious surfaces, including the building footprint, driveway(s), patio(s), impervious deck(s), unroofed porch(es), uncovered parking lot (including top deck of parking structure), impervious trails, miscellaneous paving or structures, and off-lot impervious surface (new, contiguous impervious surface created from road projects, including sidewalks and/or bike lanes built as part of new street). Impervious surfaces do NOT include vegetated roofs or pervious pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding, unpaved landscaped areas, or that stores and infiltrates the C.3.d amount of runoff*.

[3] "Replaced" means that the project will install impervious surface where existing impervious surface is removed.

[4] "Created" means the project will install new impervious surface where there is currently no impervious surface.

* For definitions, see Glossary (Attachment 1).

4.2 Answer this question ONLY if you are completing this section for the entire project area. If existing impervious surface will be replaced by the project, does the area to be replaced equal 50% or more of the existing area of impervious surface? *(Refer to Table 1, Row "a". Is the area in Column 2 > 50% of Column 1?)*

☑ Yes, C.3. stormwater treatment requirements apply to areas of impervious surface that will remain in place as well as the area created and/or replaced. This is known as the 50% rule.

☐ No, C.3. requirements apply only to the impervious area created and/or replaced.

4.3 Enter the square footage of the Potential Rainwater Capture Area*. If you are evaluating only the roof area of a building, or you answered "no" to Question 4.2, this amount is from Row "b" in Table 1. If you answered "yes" to Question 4.2, this amount is the sum of Rows "b" and "c" in Table 1.:

359,730 square feet.

4.4 Convert the measurement of the Potential Rainwater Capture Area* from square feet to acres (divide the amount in Item 4.3 by 43,560):

8.3 acres.

5. Feasibility Screening for Rainwater Harvesting and Use

5.1 Use of harvested rainwater for landscape irrigation:

Is the onsite landscaping LESS than 2.5 times the size of the Potential Rainwater Capture Area* (Item 4.3)? (Note that the landscape area(s) would have to be contiguous and within the same Drainage Management Area to use harvested rainwater for irrigation via gravity flow.)

☑ Yes (continue) ☐ No – Direct runoff from impervious areas to self-retaining areas* OR refer to Table 11 and the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for irrigation.

5.2 Use of harvested rainwater for toilet flushing or non-potable industrial use:

a. Residential Projects: Proposed number of dwelling units: 206
Calculate the dwelling units per impervious acre by dividing the number of dwelling units by the acres of the Potential Rainwater Capture Area* in Item 4.4. Enter the result here:

24.8)

Is the number of dwelling units per impervious acre LESS than 100 (assuming 2.7 occupants/unit)?

☑ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet.

b. Commercial/Industrial Projects: Proposed interior floor area: _____ (sq. ft.)

Calculate the proposed interior floor area (sq.ft.) per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the Potential Rainwater Capture Area* in Item 4.4. Enter the result here:*

_____

Is the square footage of the interior floor space per impervious acre LESS than 70,000 sq. ft.?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

c. School Projects: Proposed interior floor area: _____ (sq. ft.)

Calculate the proposed interior floor area per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the Potential Rainwater Capture Area* in Item 4.4 . Enter the result here:*

_____.

Is the square footage of the interior floor space per impervious acre LESS than 21,000 sq. ft.?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

* For definitions, see Glossary (Attachment 1).

d. Mixed Commercial and Residential Use Projects

- Evaluate the residential toilet flushing demand based on the dwelling units per impervious acre for the residential portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to residential use.
- Evaluate the commercial toilet flushing demand per impervious acre for the commercial portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to commercial use.

e. Industrial Projects: Estimated non-potable water demand (gal/day): _____

Is the non-potable demand LESS than 2,400 gal/day per acre of the Potential Rainwater Capture Area?

☐ Yes (continue) ☐ No – refer to the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for industrial use.

6. Use of Biotreatment

If only the "Yes" boxes were checked for all questions in Sections 2 and 5, or the project will have a recycled water system for non-potable use (Section 3), then the applicant may use appropriately designed bioretention facilities for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.

7. Results of Screening Analysis

Based on this screening analysis, the following steps will be taken for the project (check all that apply):

☑ Implement biotreatment measures (such as an appropriately designed bioretention area).

☐ Conduct further analysis of infiltration feasibility by completing the Infiltration Feasibility Worksheet.

☐ Conduct further analysis of rainwater harvesting and use (check one):

☐ Complete the Rainwater Harvesting and Use Feasibility Worksheet for:

☐ The entire project

☐ Individual building(s), if applicable, describe:_____

☐ Evaluate the feasibility of harvesting and using the C.3.d amount of runoff for irrigation, based on Table 11 and the curves in Appendix F of the LID Feasibility Report

☐ Evaluate the feasibility of harvesting and using the C.3.d amount of runoff for non-potable industrial use, based on the curves in Appendix F of the LID Feasibility Report.

* For definitions, see Glossary (Attachment 1).

Appendix C

Appendix C intentionally left blank - Special Project Worksheet not applicable to this project

Appendix D

The faults considered capable of generating significant earthquakes are generally associated with the well-defined areas of crustal movement, which trend northwesterly. The table below presents the State-considered active faults within 25 kilometers of the site.

Table 1: Approximate Fault Distances

Fault Name	Distance	
	(miles)	(kilometers)
Hayward (Southeast Extension)	2.6	4.3
Hayward (Total Length)	5.3	8.6
Calaveras – South	6.0	9.7
Calaveras – North	6.6	10.7
Monte Vista-Shannon	11.2	18.0
San Andreas (Peninsula)	14.9	24.0

A regional fault map is presented as Figure 3, illustrating the relative distances of the site to significant fault zones.

SECTION 3: SITE CONDITIONS

3.1 SITE BACKGROUND

Our review of available historic aerial photographs indicates the Pirnik parcel has been occupied by the existing auto storage and parts dismantling facility since the 1980s. The Meeks parcels were previously occupied by an auto storage facility or auto recycling and parts dismantling facility since the 1960s. The Tavakoli parcel was previously occupied by an auto dismantling and Pick Your Part facility between 1983 and 2008, and a RV storage facility from 2008 to present. Prior to this, the site appears to have been use for agricultural purposes. Several residential and appurtenant barn structures also were previously located on the southern end of the site, near what is now Trade Zone Boulevard.

A more detailed description of the site history is presented in the Phase I Environmental Site Assessment prepared by Cornerstone Earth Group.

3.2 SURFACE DESCRIPTION

The following site descriptions are based on site observations prior to site demolition. At the time this report was completed, demolition had been performed and remedial grading was underway.

3.2.1 Pirnik Parcel

The Pirnik Parcel is an approximately 4.4-acre rectangular parcel located at 569-573 Trade Zone Boulevard that is bounded by Trade Zone Boulevard to the south, three existing commercial buildings to the west, existing commercial development to the north and the existing vacant Meeks parcels to the east. The site was recently occupied by an auto wrecking facility and is bordered by chain link fencing. The facility includes three metal-framed buildings near the south end of the parcel. Most of the site was covered with gravel fill, on which numerous rows of old cars, metal shelving for auto parts storage and miscellaneous salvage equipment is stored. A few mature trees were observed adjacent to Trade Zone Boulevard. The buildings adjacent to Trade Zone Boulevard are surrounded by asphalt concrete pavement that appears to be in fair to poor condition. We understand the facility was served by an on-site septic system, the location and depth of which is not known at this time, but is reported to be near the existing buildings at the south end of the site.

Based on our review of available topographic maps, the site is generally at about Elevation 37 to 40 feet (NGVD 1929).

3.2.2 Meeks Parcels

The Meeks Parcels consist of two parcels totaling approximately 5.73-acre located at 595 and 615 Trade Zone Boulevard. The parcels are bounded by Trade Zone Boulevard to the south, an existing auto recycling facility (Pirnik parcel) to the west, and existing commercial development to the north and east. The site was previously occupied by a Pick-Your-Part auto recycling facility but is currently vacant. The site is bordered by chain link fencing. Remnants of the former facility include the former office and shop building at the southwest corner of the site, the concrete slab from a former office building at the southeast corner of the site, the concrete pad from a former shop or barn structure along the eastern property boundary, the former truck scale along the western property boundary, and the former car crushing area at the northwest corner of the site.

Recent environmental remediation at the site included excavation, removal and backfill at the former fluid recovery area located just north of the existing shop/office building (ECA, 2011). A more detailed description of the previous remediation activities at the site are presented in our Phase I/II Environmental report. The approximate locations of these former improvements are shown on the Site Plan, Figure 2.

Most of the site was covered with gravel fill and minor sparse grasses and weeds. The area between Trade Zone Boulevard and the existing building was covered by asphalt concrete pavement that appeared to be in poor condition. We understand the property is served by an on-site septic system, the location and depth of which is not known at this time, but is reported to be near the existing building at the southwest corner of the site.

Based on our review of available topographic maps, the Meeks Parcels are generally at about Elevation 39 to 43 feet (NGVD 1929).

3.2.3 Tavakoli Parcel

The Tavakoli Parcel is an approximately 2.2-acre rectangular parcel located at 625 Trade Zone Boulevard that is bounded by Trade Zone Boulevard to the south, the Meeks Parcels to the west, and existing commercial development to the north and east. The site was previously occupied by an auto dismantling facility, but had recently been used for RV storage and cleaning. The site is bordered by chain link fencing.

Based on our review of available topographic maps, the Tavakoli Parcel is generally at about Elevation 40 to 44 feet (NGVD 1929).

3.3 SUBSURFACE CONDITIONS

3.3.1 Pirnik Parcel

3.3.1.1 Existing Fill Materials

On the Pirnik Parcel, our explorations generally encountered undocumented fill to depths ranging from approximately 1 to 2 feet. The fill consisted of medium dense clayey sand with varying gravel content and occasional inert pieces of debris, such as small metal and glass fragments. Previous and existing on-site structures may also be underlain by undocumented fills; the lateral extent and depth of these fills is not known at this time and should be further evaluated during the design-level geotechnical investigation.

3.3.1.2 Native Alluvial Soils

The fill is underlain by native alluvial soil consisting of stiff to very stiff fat clay to a depth of approximately 4 feet and medium stiff to stiff lean clay with varying sand content to a depth of approximately 20 to 22 feet. Below these depths, our explorations encountered stiff to very stiff sandy lean clay interbedded with occasional thin layers of clayey and silty sand to the maximum depth explored at 50 feet. The sand layers were generally medium dense to dense and ranged from a few inches thick up to approximately 4 feet thick. A more detailed description of the subsurface conditions is presented on the boring and CPT logs in Appendix A.

3.3.2 Meeks Parcels

3.3.2.1 Existing Fill Materials

Our previous explorations generally encountered undocumented fill blanketing the Meeks Parcels to depths ranging from approximately 1½ to 3 feet. The fill consisted of medium dense clayey sand with varying gravel content and very stiff clay with sand; the fill also contained occasional inert pieces of debris, such as small metal and glass fragments. Previous and existing on-site structures may also be underlain by undocumented fills; the lateral extent and depth of these fills is not known at this time and should be further evaluated during demolition.

Based on our review of the Remedial Action Completion (RAC) Report prepared by ECA dated October 2011, an excavation was performed at the former Fluid Recovery Area (FRA) located near the southwest corner of the Meeks Parcels. The RAC report indicated that an excavation in the former FRA was made to a maximum depth of approximately 6 feet below existing site grades to remove contaminated soils. Upon completion, the excavation was reportedly backfilled with granular material imported from Stevens Creek Quarry in Cupertino. The contractor that performed the work was to compact the imported fill material to at least 90 percent relative compaction. Field density tests were performed during backfilling by an independent materials testing laboratory. The results of the tests indicate that fill compaction was at or above the minimum requirements where tested. The results of the field density tests were presented in Appendix H of the ECA report dated October 2011. The approximate lateral extent of the previous FRA backfill is shown on the Site Plan, Figure 2.

3.3.2.2 Native Alluvial Soils

The fill on the Meeks Parcels is underlain by native alluvial soil consisting of stiff to very stiff fat clay to a depth of approximately 4 to 5 feet and medium stiff to very stiff lean clay with sand and sandy lean clay to a depth of approximately 50 feet, the maximum depth explored. The explorations encountered occasional discontinuous layers of interbedded clayey and silty sand. The sand layers were generally medium dense to dense and ranged from a few inches thick up to approximately 3½ feet thick. A more detailed description of the subsurface conditions is presented on the boring and CPT logs in Appendix A.

3.3.3 Tavakoli Parcel

3.3.3.1 Existing Fill Materials

On the Tavakoli Parcel, our previous explorations generally encountered undocumented fill to a depth of approximately 1 foot. The fill consisted of sandy gravel with varying silt and clay fines. Previous and existing on-site structures may also be underlain by undocumented fills; the lateral extent and depth of these fills is not known at this time and should be further evaluated during demolition.

3.3.3.2 Native Alluvial Soils

The fill on the Tavakoli Parcel is underlain by native alluvial soil consisting of stiff to very stiff fat clay to a depth of approximately 2 to 3½ feet and medium stiff to very stiff lean clay with sand and lean clay to a depth of approximately 15 feet, the maximum depth explored on the Tavakoli Parcel. A more detailed description of the subsurface conditions is presented on the boring logs in Appendix D.

3.3.4 Plasticity/Expansion Potential

We previously performed six Plasticity Index (PI) tests on representative samples of the near-surface native soil and deeper alluvial soil. Test results were used to evaluate expansion potential of surficial soils and the susceptibility for seismic settlement of deeper soils. The

results of the surficial PI tests indicated PIs ranging from 24 to 34, indicating high expansion potential to wetting and drying cycles for the underlying native clay. The deeper alluvial clays at a depth of approximately 22 and 22½ feet exhibited PIs of 11 to 12 and a Liquid Limit of 26 to 30 percent, indicating low expansion potential and clay-like behavior for representative clay materials between depths of approximately 20 to 30 feet.

3.3.5 In-Situ Moisture Contents

Laboratory testing indicated that the in-situ moisture contents within the upper 10 feet range from about 8 to 12 percent over the estimated laboratory optimum moisture.

3.4 GROUND WATER

Ground water was previously encountered in Borings EB-1, 2 and 3 at depth of approximately 10 to 14 feet and rose to a depth of 5 to 13½ feet immediately after drilling was completed. In one of our recent explorations (Boring TR-1), ground water was initially encountered at a depth of 11 feet, which rose to a depth of approximately 5 feet approximately one hour after drilling. The rise in ground water appears to be due to confined conditions of the water bearing zone below a depth of approximately 15 feet. In general, the borings were not left open but were backfilled once the boring was completed; therefore, measured ground water depths may not represent stabilized ground water levels. Pore pressure dissipation tests were performed during CPT-1 and CPT-6 that measured a water level at approximately 6 to 6½ feet below the ground surface.

Our environmental borings performed with hollow stem auger equipment encountered initial ground water at depths ranging from approximately 12 to 18 feet; with ground water in two borings rising to a depth of approximately 7½ and 8 feet below the ground surface. Based on our previous experience in the area and review of historic depth to ground water maps (CGS 2004), historic high ground water is mapped to be approximately 8 to 10 feet below current site grades under confined conditions.

Fluctuations in ground water levels occur due to many factors including seasonal fluctuation, underground drainage patterns, regional fluctuations, and other factors.

3.5 CORROSION SCREENING

We tested four sample collected at depths ranging from approximately 1½ to 6 feet for in-situ resistivity, pH, soluble sulfates, and chlorides. We also tested seven samples (TR-2 to 8) in accordance with PG&E requirements for Type I below-grade transformers collected at a depth of 4½ feet, and one sample (TR-1) for a Type II below-grade transformer at a depth of 7½ feet for resistivity, Redox potential, pH, soluble sulfates, sulfides and chlorides. The laboratory test results are summarized in the following table.

Table 2: Summary of Corrosion Test Results

Sample Location Number	Depth (feet)	Soil pH	Minimum Resistivity[1] (ohm-cm)	Chloride (mg/kg)	Sulfate (% by weight)	Sulfide	Redox Potential (mV)
EB-1	4½	7.6	1,683	12	0.0083	--	--
EB-2	1½	7.5	1,385	60	0.0081	--	--
EB-2	6	7.7	1,248	62	0.0109	--	--
EB-4	4½	7.8	2,066	11	0.0054	--	--
TR-1	7½	7.9	1,283	21	0.0068	Negative	528
TR-2	4½	7.9	1,767	13	0.0047	Negative	538
TR-3	4½	8.1	1,948	8	0.0047	Negative	547
TR-4	4½	7.9	1,242	26	0.0137	Negative	551
TR-5	4½	8.0	2,628	4	0.0026	Negative	553
TR-6	4½	7.8	1,475	9	0.0042	Negative	546
TR-7	4½	8.0	2,005	16	0.0047	Negative	554
TR-8	4½	8.2	2,244	16	0.0048	Negative	565

Note: (1) Resistivity tests performed at 100% saturation

Many factors can affect the corrosion potential of soil including moisture content, resistivity, permeability, and pH, as well as chloride and sulfate concentration. Typically, soil resistivity, which is a measurement of how easily electrical current flows through a medium (soil and/or water), is the most influential factor. In addition to soil resistivity, chloride and sulfate ion concentrations, and pH also contribute in affecting corrosion potential.

3.5.1 Preliminary Soil Corrosion Screening

Based on the laboratory test results summarized in Table 2, the near-surface soils are considered moderately to severely corrosive to buried metallic improvements (Palmer, 1989). Other corrosion parameters (pH, chloride and sulfate ion content) do not indicate a significant corrosion potential to buried concrete structures. In accordance with the 2009 IBC, Chapter 19, Section 1904.5, alternative cementitious materials for sulfate exposure shall be in accordance with the following:

- ACI 318-08
- Table 4.2.1, and Table 4.3.1

Based on the laboratory test results, Type II cement with a minimum compressive strength (f_c') of 2,500 pounds per square inch (psi) can likely be used for the in-situ soil tested. We have summarized applicable design values and parameters from ACI 318, Table 4.3.1 below in Table 3 for your information. We recommend that the structural engineer and a corrosion engineer be retained to confirm the information provided and to provide additional recommendations, as required.

Table 3: Sulfate Soil Corrosion Design Values and Parameters [1]

Category	Water-Soluble Sulfate (SO_4) in Soil (% by weight)	Class	Severity	Cementitious Materials[2]
S, Sulfate	< 0.10	S0	Not applicable	No type restriction

Notes: (1) above values and parameters are from on ACI 318-08, Table 4.2.1 and Table 4.3.1
(2) cementitious materials are in accordance with ASTM C150, ASTM C595 and ASTM C1157

3.5.2 Summary

Based on the above information, the on-site soils within the upper 7½ feet can be characterized as moderately to severely corrosive to buried metallic improvements and relatively noncorrosive to buried concrete. We recommend a corrosion engineer and/or utility consultant be retained to provide additional recommendations, as required, for any buried metallic improvements. The concrete mix design would not require modification in accordance with ACI Code 318 requirements.

As discussed, below-grade transformers are proposed at several locations on the site. The soil corrosion test results from Boring TR-1 at a depth of 7½ feet and Borings TR-2 through TR-8 at a depth of 4½ feet were evaluated in accordance with PG&E requirements for Type II and I below-grade transformers (PG&E ED 072149, 2010), respectively. The results of the evaluation indicate that soils at the proposed transformer locations do not pass the PG&E requirements; therefore, for corrosion mitigation will be required. Since the ground water level at TR-1 is within 3 feet of the bottom of the proposed transformer, an above-ground transformer will be required per PG&E ED 072149, 2010. The results are summarized in the "Results Data Sheet – Soil Corrosivity Testing for PG&E Subsurface Transformers" in Appendix C.

SECTION 4: GEOLOGIC HAZARDS

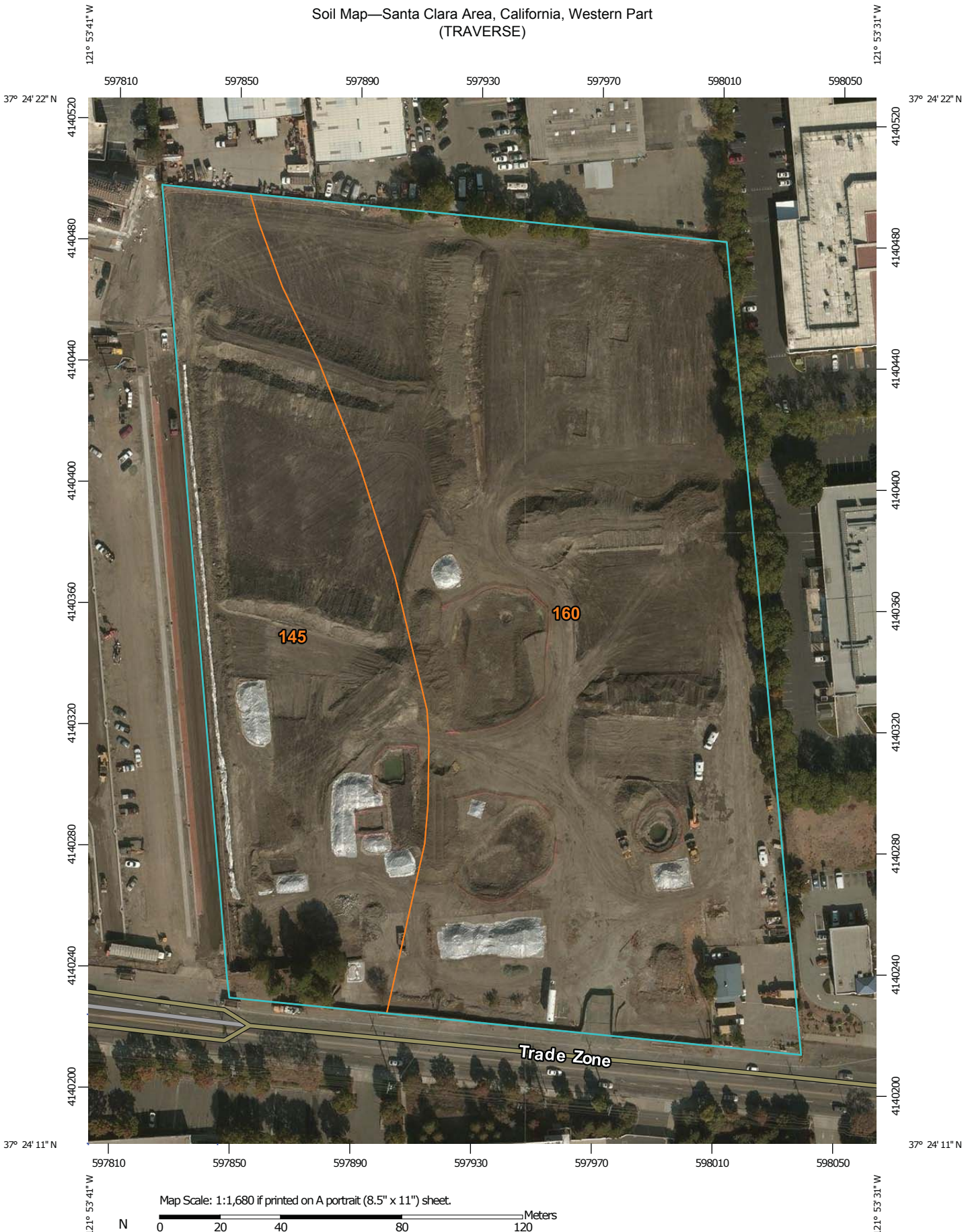
4.1 FAULT RUPTURE

As discussed above several significant faults are located within 25 kilometers of the site. The site is not located within a State-designated Alquist-Priolo Earthquake Fault Zone or a Santa Clara County Fault Hazard Zone. As shown in Figure 3, no known surface expression of fault traces is thought to cross the site; therefore, fault rupture hazard is not a significant geologic hazard at the site.

4.2 ESTIMATED GROUND SHAKING

Moderate to severe (design-level) earthquakes can cause strong ground shaking, which is the case for most sites within the Bay Area. A peak ground acceleration (PGA) was estimated for analysis using $PGA_M = F_{PGA} * PGA_G$ (Equation 11.8-1) as allowed in the 2013 California Building Code. For our liquefaction analysis, we used a PGA of 0.61g.

Soil Map—Santa Clara Area, California, Western Part
(TRAVERSE)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 3, Sep 18, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 7, 2013—Nov 3, 2013

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Santa Clara Area, California, Western Part (CA641)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
145	Urbanland-Hangerone complex, 0 to 2 percent slopes, drained	3.9	31.3%
160	Urbanland-Clear Lake complex, 0 to 2 percent slopes	8.5	68.7%
Totals for Area of Interest		**12.4**	**100.0%**

Santa Clara Area, California, Western Part

145—Urbanland-Hangerone complex, 0 to 2 percent slopes, drained

Map Unit Setting

National map unit symbol: 1nszw
Elevation: 0 to 220 feet
Mean annual precipitation: 14 to 24 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Hangerone, drained, and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Disturbed and human-transported material

Description of Hangerone, Drained

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics

Typical profile

A1 - 0 to 9 inches: clay
A2 - 9 to 17 inches: clay
Bw - 17 to 27 inches: clay
Bk - 27 to 35 inches: clay
Ck - 35 to 45 inches: clay loam
C - 45 to 72 inches: gravelly loam
2Ab - 72 to 89 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.2 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C

Minor Components

Bayshore

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Clear lake

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Embarcadero

Percent of map unit: 1 percent
Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Data Source Information

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 3, Sep 18, 2014

Santa Clara Area, California, Western Part

160—Urbanland-Clear Lake complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1nszs
Elevation: 0 to 230 feet
Mean annual precipitation: 14 to 24 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 65 percent
Clear lake and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Disturbed and human transported material

Description of Clear Lake

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics

Typical profile

Ap1 - 0 to 9 inches: silty clay
Ap2 - 9 to 14 inches: silty clay
Bw - 14 to 32 inches: silty clay
Bss - 32 to 50 inches: silty clay
C - 50 to 66 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C

Minor Components

Hangerone, drained

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Campbell

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Data Source Information

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 3, Sep 18, 2014

Appendix E

Infiltration Feasibility Worksheet

Municipal Regional Stormwater Permit (MRP)
Stormwater Controls for Development Projects

Not required per worksheet in Appendix B - Site contains type C or type D soils.

Complete this worksheet for C.3 Regulated Projects* *for which the soil hydraulic conductivity (Ksat) exceeds 1.6. Use this checklist to determine the feasibility of treating the* C.3.d *amount of runoff** *with infiltration. Where it is infeasible to treat the C.3.d amount of runoff* with infiltration or rainwater harvesting and use, stormwater may be treated with* biotreatment* *measures. See Glossary (Attachment 1) for definitions of terms marked with an asterisk (*).*

1. Enter Project Data.

1.1 Project Name: _____

1.2 Project Address: _____

1.3 Applicant/Agent Name: _____

1.4 Applicant/Agent Address: _____

1.5 Applicant/Agent Email: _____ Applicant / Agent Phone: _____

2. Evaluate infiltration feasibility.

Check "Yes" or "No" to indicate whether the following conditions apply to the project. If "Yes" is checked for any question, then infiltration is infeasible, and you can continue to Item 3.1 without answering any further questions in Section 2. If all of the answers in Section 2 are "No," then infiltration is feasible, and you may design infiltration facilities for the area from which runoff must be treated. Items 2.1 through 2.3 address the feasibility of using infiltration facilities*, as well as the potential need to line bioretention areas.*

		Yes	No
2.1	Would infiltration facilities at this site conflict with the location of existing or proposed underground utilities or easements, or would the siting of infiltration facilities at this site result in their placement on top of underground utilities, or otherwise oriented to underground utilities, such that they would discharge to the utility trench, restrict access, or cause stability concerns? (If yes, attach evidence documenting this condition.)	☐	☐
2.2	Is there a documented concern that there is a potential on the site for soil or groundwater pollutants to be mobilized? (If yes, attach documentation of mobilization concerns.)	☐	☐
2.3	Are geotechnical hazards present, such as steep slopes, areas with landslide potential, soils subject to liquefaction, or would an infiltration facility need to be built less than 10 feet from a building foundation or other improvements subject to undermining by saturated soils? (If yes, attach documentation of geotechnical hazard.)	☐	☐

Respond to Questions 2.4 through 2.8 only if the project proposes to use an infiltration device*.

2.4	Do local water district or other agency's policies or guidelines regarding the locations where infiltration may occur, the separation from seasonal high groundwater, or setbacks from potential sources of pollution prevent infiltration devices from being implemented at this site? (If yes, attach evidence documenting this condition.)	☐	☐
2.5	Would construction of an infiltration device require that it be located less than 100 feet away from a septic tank, underground storage tank with hazardous materials, or other potential underground source of pollution? (If yes, attach evidence documenting this claim.)	☐	☐

Infiltration Feasibility Worksheet

		Yes	No
2.6	Is there a seasonal high groundwater table or mounded groundwater that would be within 10 feet of the base of an infiltration device* constructed on the site? (If yes, attach documentation of high groundwater.)	☐	☐
2.7	Are there land uses that pose a high threat to water quality – including but not limited to industrial and light industrial activities, high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway), automotive repair shops, car washes, fleet storage areas, or nurseries? (If yes, attach evidence documenting this claim.)	☐	☐
2.8	Is there a groundwater production well within 100 feet of the location where an infiltration device would be constructed? (If yes, attach map showing the well.)	☐	☐

3. Results of Feasibility Determination

		Infeasible	Feasible
3.1	Based on the results of the Section 2 feasibility analysis, infiltration is (check one):	☐	☐

→ *If "FEASIBLE" is indicated for Item 3.1, then the amount of stormwater requiring treatment must be treated with infiltration (or rainwater harvest and use, if feasible).* ***Infiltration facilities**** *may be designed for the area from which runoff must be treated.*

→ *If "INFEASIBLE" is checked for item 3.1, then the applicant may use appropriately designed* ***biotreatment facilities**** *for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.*

Name of Applicant (Print)

Name of Applicant (Sign) Date

* See Glossary (Attachment 1) for definitions.

Appendix F

TABLE 1 - Site Data

Existing Site - Surface Type

Impervious Surface	Area (SF)	Area (AC)	%	C
Roof/Pavement/Concrete	*130,680*	*3.0*	*24%*	*0.80*
Pervious Surface				
General	*413,820*	*9.5*	*76%*	*0.10*
Total	**544,500**	**12.5**	**100%**	**0.27**

Proposed Site - Surface Type

Impervious Surface	Area (SF)	Area (AC)	%	C
Roof	*168,795*	*3.875*	*31%*	*0.90*
Concrete	*76,230*	*1.750*	*14%*	*0.80*
Asphalt	*152,460*	*3.500*	*28%*	*0.70*
Pervious Surface				
Landscape	*147,015*	*3.375*	*27%*	*0.10*
Total	**544,500**	**12.50**	**100%**	**0.61**

TABLE 2 - Estimated Runoff Coefficients for Various Surfaces

(Table B-3 from SCVURPP's C.3 Stormwater Handbook, April 2012)

Types of Surface	"C" Factor
Roofs	0.90
Concrete	0.80
Stone, Brick, or Concrte Pavers w/ mortared joints and bedding	0.80
Asphalt	0.70
Stone, Brick or Concrete Paver w/ sand joints and bedding	0.70
Pervious Concrete	0.10
Porous Asphalt	0.10
Permeable Interlocking Concrete Pavement	0.10
Grid Pavements with Grass of Aggregate Surface	0.10
Crushed Aggregate	0.10
Grass	0.10

TABLE 3: Flow and Volume Combination Calculations

PROJECT: TRAVERSE

LOCATION: MILPITAS, CA

BIORETENTION SIZING METHOD - COMBINATION FLOW AND VOLUME DESIGN BASIS

AUTHOR: EMD

DATE: August 2014

Total Site Area	12.50	ac
Net Site Area	12.50	ac
Rainfall Intensity:	0.2	in/hr
Infiltration Rate:	5	in/hr
NRCS Soil Type	D	
MAPsite	14.5	in
MAPgage	13.9	in
CORR	1.043	*(Rain Gage Correction Factor)*

BMP ID	Total DMA Area		Impervious Area	Pervious Area	Current Treatment Area	% IMP	Unit Storage Volume	Required Capture Volume	Rainfall Duration	Volume Inflow	Remaining Volume	Ponding Depth
	sf	ac	sf	sf	sf		in	cf	hr	cf	cf	in
1-A	1460	0.03	1460	0	49	100.0%	0.570	72	2.85	58	14	3.5
1-B	1220	0.03	1220	0	43	100.0%	0.570	60	2.85	51	9	2.6
2-A	1460	0.03	1460	0	48	100.0%	0.570	72	2.85	57	15	3.8
2-B	1220	0.03	1220	0	40	100.0%	0.570	60	2.85	47	13	3.9
3-A	1320	0.03	1320	0	48	100.0%	0.570	65	2.85	57	8	2.1
3-B	1220	0.03	1220	0	40	100.0%	0.570	60	2.85	47	13	3.9
4-A	1320	0.03	1320	0	49	100.0%	0.570	65	2.85	58	7	1.8
4-B	1220	0.03	1220	0	43	100.0%	0.570	60	2.85	51	9	2.6
5-A	1380	0.03	1380	0	49	100.0%	0.570	68	2.85	58	10	2.5
5-B	1220	0.03	1220	0	43	100.0%	0.570	60	2.85	51	9	2.6
6-A	1520	0.03	1520	0	56	100.0%	0.570	75	2.85	66	9	1.9
6-B	1220	0.03	1220	0	43	100.0%	0.570	60	2.85	51	9	2.6
7-A	1520	0.03	1520	0	56	100.0%	0.570	75	2.85	66	9	1.9
7-B	1220	0.03	1220	0	44	100.0%	0.570	60	2.85	52	8	2.2
8-A	1320	0.03	1320	0	49	100.0%	0.570	65	2.85	58	7	1.8
8-B	1430	0.03	1430	0	49	100.0%	0.570	71	2.85	58	13	3.1
9-A	1400	0.03	1400	0	49	100.0%	0.570	69	2.85	58	11	2.7
9-B	1530	0.04	1530	0	56	100.0%	0.570	76	2.85	66	9	2.0
10-A	1730	0.04	1730	0	63	100.0%	0.570	86	2.85	75	11	2.1
10-B	1400	0.03	1400	0	49	100.0%	0.570	69	2.85	58	11	2.7
11-A	1590	0.04	1590	0	56	100.0%	0.570	79	2.85	66	12	2.6
11-B	1400	0.03	1400	0	49	100.0%	0.570	69	2.85	58	11	2.7
12-A	1400	0.03	1400	0	49	100.0%	0.570	69	2.85	58	11	2.7
12-B	1530	0.04	1530	0	54	100.0%	0.570	76	2.85	64	12	2.6
13-A	1390	0.03	1390	0	49	100.0%	0.570	69	2.85	58	11	2.6
13-B	1360	0.03	1360	0	45	100.0%	0.570	67	2.85	53	14	3.7
14-A	1360	0.03	1360	0	47	100.0%	0.570	67	2.85	56	12	3.0
14-B	1390	0.03	1390	0	46	100.0%	0.570	69	2.85	55	14	3.7
15-A	1035	0.02	1035	0	37	100.0%	0.570	51	2.85	44	7	2.4
15-B	1720	0.04	1720	0	59	100.0%	0.570	85	2.85	70	15	3.1
16-A	1320	0.03	1320	0	45	100.0%	0.570	65	2.85	53	12	3.2
16-B	1220	0.03	1220	0	40	100.0%	0.570	60	2.85	47	13	3.9
17-A	1460	0.03	1460	0	49	100.0%	0.570	72	2.85	58	14	3.5
17-B	1220	0.03	1220	0	43	100.0%	0.570	60	2.85	51	9	2.6
18-A	1860	0.04	1860	0	62	100.0%	0.570	92	2.85	74	19	3.6

BMP ID	Total DMA Area		Impervious Area	Pervious Area	Current Treatment Area	% IMP	Unit Storage Volume	Required Capture Volume	Rainfall Duration	Volume Inflow	Remaining Volume	Ponding Depth
	sf	ac	sf	sf	sf		in	cf	hr	cf	cf	in
18-B	1430	0.03	1430	0	49	100.0%	0.570	71	2.85	58	13	3.1
19-A	1860	0.04	1860	0	62	100.0%	0.570	92	2.85	74	19	3.6
19-B	1430	0.03	1430	0	49	100.0%	0.570	71	2.85	58	13	3.1
20-A	1860	0.04	1860	0	62	100.0%	0.570	92	2.85	74	19	3.6
20-B	1430	0.03	1430	0	49	100.0%	0.570	71	2.85	58	13	3.1
21-A	1860	0.04	1860	0	62	100.0%	0.570	92	2.85	74	19	3.6
21-B	1430	0.03	1430	0	49	100.0%	0.570	71	2.85	58	13	3.1
22-A	1355	0.03	1355	0	49	100.0%	0.570	67	2.85	58	9	2.2
22-B	1655	0.04	1655	0	58	100.0%	0.570	82	2.85	69	13	2.7
23-A	1655	0.04	1655	0	55	100.0%	0.570	82	2.85	65	17	3.6
23-B	1840	0.04	1840	0	61	100.0%	0.570	91	2.85	72	19	3.7
24-A	1655	0.04	1655	0	61	100.0%	0.570	82	2.85	72	10	1.9
24-B	1840	0.04	1840	0	61	100.0%	0.570	91	2.85	72	19	3.7
25-A	2710	0.06	2710	0	94	100.0%	0.570	134	2.85	112	23	2.9
25-B	1655	0.04	1655	0	58	100.0%	0.570	82	2.85	69	13	2.7
26-A	1655	0.04	1655	0	58	100.0%	0.570	82	2.85	69	13	2.7
27-A	1655	0.04	1655	0	58	100.0%	0.570	82	2.85	69	13	2.7
27-B	1060	0.02	1060	0	35	100.0%	0.570	53	2.85	42	11	3.8
28-A	1655	0.04	1655	0	56	100.0%	0.570	82	2.85	66	16	3.3
28-B	1060	0.02	1060	0	37	100.0%	0.570	53	2.85	44	9	2.8
29-A	1655	0.04	1655	0	58	100.0%	0.570	82	2.85	69	13	2.7
29-B	1355	0.03	1355	0	49	100.0%	0.570	67	2.85	58	9	2.2
BIO-1	4920	0.11	4920	0	164	100.0%	0.570	244	2.85	195	49	3.6
BIO-2	6870	0.16	6870	0	229	100.0%	0.570	340	2.85	272	68	3.6
BIO-3	10600	0.24	10600	0	360	100.0%	0.570	525	2.85	427	98	3.3
BIO-4	14200	0.33	14200	0	477	100.0%	0.570	703	2.85	566	137	3.5
BIO-5	5150	0.12	5150	0	170	100.0%	0.570	255	2.85	202	53	3.8
BIO-6	5600	0.13	5600	0	191	100.0%	0.570	277	2.85	227	51	3.2
BIO-7	6860	0.16	6860	0	230	100.0%	0.570	340	2.85	273	67	3.5
BIO-8	3470	0.08	3470	0	119	100.0%	0.570	172	2.85	141	31	3.1
BIO-9	3280	0.08	3280	0	113	100.0%	0.570	162	2.85	134	28	3.0
BIO-10	5670	0.13	5670	0	195	100.0%	0.570	281	2.85	232	49	3.0
BIO-11	10890	0.25	10890	0	360	100.0%	0.570	540	2.85	427	112	3.7
BIO-12	1120	0.03	1120	0	40	100.0%	0.570	55	2.85	47	8	2.4
BIO-13	8880	0.20	8880	0	329	100.0%	0.570	440	2.85	391	49	1.8
BIO-14	26570	0.61	26570	0	875	100.0%	0.570	1316	2.85	1039	277	3.8
BIO-15	2440	0.06	2440	0	80	100.0%	0.570	121	2.85	95	26	3.9
BIO-16	4020	0.09	4020	0	132	100.0%	0.570	199	2.85	157	42	3.9
BIO-17	2820	0.06	2820	0	94	100.0%	0.570	140	2.85	112	28	3.6

Section II. Sizing for Volume-Based Treatment Measures

The MRP Provision C.3.d allows two methods for sizing volume-based controls: 1) the WEF Urban Runoff Quality Management Method (URQM Method); or 2) the CASQA Stormwater Best Management Practice[2] (BMP) Handbook Volume Method adapted for Santa Clara Valley. The adapted CASQA Stormwater BMP Handbook Method is recommended because it is based on local rainfall data. Steps for applying these methods are presented in Sections II.A. and II.B. below.

Section II.A.— Sizing Volume-Based Treatment Measures based on the Urban Runoff Quality Management Approach (URQM Approach)

The equations used in this method are:

$$P_o = (a \times C_w) \times P_6$$

$$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where:

P_o = maximized detention storage volume (inches over the drainage area to the BMP)
a = regression constant (unitless)
C_w = watershed runoff coefficient (unitless)[3]
P_6 = mean storm event precipitation depth (inches);
i = watershed impervious ratio (range: 0-1)

Step 1. Determine the drainage area for the BMP, A = .00034 acres 15 sf = .00034 acres

Step 2. Determine the watershed impervious ratio, "*i*", which is the amount of impervious area in the drainage area to the BMP divided by the drainage area, or the percent of impervious area in the drainage area divided by 100.

a. Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP = .00034 acres

b. Calculate the watershed impervious ratio, *i*:

i = amount of impervious area (acres)/drainage area for the BMP (acres)

i = (**Step 2.a**)/(**Step 1**) = 1 (range: 0-1)

[2] For the purpose of this worksheet, a stormwater best management practice, or BMP, is the same as a stormwater treatment measure.

[3] For the purpose of this worksheet, the watershed runoff coefficient is notated as "C_w" to avoid confusion with the runoff coefficient "C" used in the Rational Method.

Section II. Sizing for Volume-Based Treatment Measures (continued)

Section II.A.— URQM Approach (continued)

Step 3. Determine the watershed runoff coefficient, "C_w", using the following equation:

$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$, using "i" from **Step 2.b.**

C_w = 0.892

Step 4. Find the mean annual precipitation at the site (MAP_{site}). To do so, estimate where the site is on Figure B-1 and estimate the mean annual precipitation in inches from the rain line (isopleth) nearest to the project site.[4]

Mean annual precipitation at the site, MAP_{site} = 14.5

(Each line on the figure, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year (e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year). If the project location is between two lines, estimate the mean annual rainfall depending on the location of the site.)

Step 5. Identify the reference rain gage closest to the project site from Table B-2a.

Table B-2a: Precipitation Data for Three Reference Gages

Gages	Mean Annual Precipitation (MAP_{gage}) (in)	Mean Storm Event Precipitation $(P_6)_{gage}$ (in)
San Jose Airport	13.9	0.512
Palo Alto	13.7	0.522
Morgan Hill	19.5	0.760

Select the MAP_{gage} and the mean storm precipitation $(P_6)_{gage}$ for the reference gage, and use them to determine $(P_6)_{site}$ for the project site in Step 6.

MAP_{gage} = 13.9

$(P_6)_{gage}$ = 0.512

[4] Check with the local municipality to determine if more detailed maps are available for locating the site and estimating MAP.

Section II. Sizing for Volume-Based Treatment Measures, continued

Section II.A.— URQM Approach (continued)

Step 6. Calculate the mean storm event precipitation depth at the project site, called $(P_6)_{site}$. Multiply the mean storm event precipitation depth for the rain gage chosen by a correction factor, which is the ratio of the mean annual precipitation at the site (MAP_{site}) to the mean annual precipitation at the rain gage (MAP_{gage}).

$$(P_6)_{site} = (P_6)_{gage} \times (MAP_{site}) / (MAP_{gage}).$$

$(P_6)_{site}$ = Mean Event Precipitation $(P_6)_{gage}$ (Step5) × (MAP_{site}) (Step4) / (MAP_{gage}) (Step5).

$P_{6\ site}$ = 0.534 inches

Step 7 Find "*a*", the regression constant (unitless)[5]:

a = 1.963 for a 48-hour drain time
a = 1.582 for a 24-hour drain time
a = 1.312 for a 12-hour drain time

a = 1.963

Recommendation: Use a 48-hour drain time.

Step 8 Determine the maximized detention storage volume P_o:

$$P_o = (a \times C_w) \times P_6$$

P_o = **(Step 7)** × **(Step 3)** × **(Step 6)**

P_o = .935 inches

Step 9 Determine the volume of the runoff to be treated from the drainage area to the BMP (i.e., the BMP design volume):

Design volume = Po × A = **(Step 8)** × **(Step 1)** ×1 foot/12 inches

Design Volume = .000027 acre-feet .000027 acre-ft x43,560 sq. ft/acre=1.17 cf

[5] *WEF Manual of Practice No. 23 and the ASCE Manual of Practice No. 87 (1998), pages 175-178.*

Section II. Sizing for Volume-Based Treatment Measures

The MRP Provision C.3.d allows two methods for sizing volume-based controls: 1) the WEF Urban Runoff Quality Management Method (URQM Method); or 2) the CASQA Stormwater Best Management Practice[2] (BMP) Handbook Volume Method adapted for Santa Clara Valley. The adapted CASQA Stormwater BMP Handbook Method is recommended because it is based on local rainfall data. Steps for applying these methods are presented in Sections II.A. and II.B. below.

Section II.A.— Sizing Volume-Based Treatment Measures based on the Urban Runoff Quality Management Approach (URQM Approach)

The equations used in this method are:

$$P_o = (a \times C_w) \times P_6$$

$$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where:

P_o = maximized detention storage volume (inches over the drainage area to the BMP)
a = regression constant (unitless)
C_w = watershed runoff coefficient (unitless)[3]
P_6 = mean storm event precipitation depth (inches);
i = watershed impervious ratio (range: 0-1)

Step 1. Determine the drainage area for the BMP, A = 0.56 acres 24,201 sf = 0.56 acres

Step 2. Determine the watershed impervious ratio, "*i*", which is the amount of impervious area in the drainage area to the BMP divided by the drainage area, or the percent of impervious area in the drainage area divided by 100.

a. Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP = 0.56 acres

b. Calculate the watershed impervious ratio, *i*:

i = amount of impervious area (acres)/drainage area for the BMP (acres)

i = (**Step 2.a**)/(**Step 1**) = 1 (range: 0-1)

[2] For the purpose of this worksheet, a stormwater best management practice, or BMP, is the same as a stormwater treatment measure.

[3] For the purpose of this worksheet, the watershed runoff coefficient is notated as "C_w" to avoid confusion with the runoff coefficient "C" used in the Rational Method.

Section II. Sizing for Volume-Based Treatment Measures (continued)

Section II.A.— URQM Approach (continued)

Step 3. Determine the watershed runoff coefficient, "C_w", using the following equation:

$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$, using "i" from **Step 2.b.**

C_w = 0.892

Step 4. Find the mean annual precipitation at the site (MAP_{site}). To do so, estimate where the site is on Figure B-1 and estimate the mean annual precipitation in inches from the rain line (isopleth) nearest to the project site.[4]

Mean annual precipitation at the site, MAP_{site} = 14.5

(Each line on the figure, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year (e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year). If the project location is between two lines, estimate the mean annual rainfall depending on the location of the site.)

Step 5. Identify the reference rain gage closest to the project site from Table B-2a.

Table B-2a: Precipitation Data for Three Reference Gages

Gages	Mean Annual Precipitation (MAP_{gage}) (in)	Mean Storm Event Precipitation $(P_6)_{gage}$ (in)
San Jose Airport	13.9	0.512
Palo Alto	13.7	0.522
Morgan Hill	19.5	0.760

Select the MAP_{gage} and the mean storm precipitation $(P_6)_{gage}$ for the reference gage, and use them to determine $(P_6)_{site}$ for the project site in Step 6.

MAP_{gage} = 13.9

$(P_6)_{gage}$ = 0.512

[4] Check with the local municipality to determine if more detailed maps are available for locating the site and estimating MAP.

Section II. Sizing for Volume-Based Treatment Measures, continued

Section II.A.— URQM Approach (continued)

Step 6. Calculate the mean storm event precipitation depth at the project site, called $(P_6)_{site}$. Multiply the mean storm event precipitation depth for the rain gage chosen by a correction factor, which is the ratio of the mean annual precipitation at the site (MAP_{site}) to the mean annual precipitation at the rain gage (MAP_{gage}).

$$(P_6)_{site} = (P_6)_{gage} \times (MAP_{site}) / (MAP_{gage}).$$

$(P_6)_{site}$ = Mean Event Precipitation $(P_6)_{gage}$ (Step5) × (MAP_{site}) (Step4) / (MAP_{gage}) (Step5).

$P_{6\ site}$ = 0.534 inches

Step 7 Find "*a*", the regression constant (unitless)[5]:

a = 1.963 for a 48-hour drain time
a = 1.582 for a 24-hour drain time
a = 1.312 for a 12-hour drain time

a = 1.963

Recommendation: Use a 48-hour drain time.

Step 8 Determine the maximized detention storage volume P_o:

$$P_o = (a \times C_w) \times P_6$$

P_o = **(Step 7)** × **(Step 3)** × **(Step 6)**

P_o = 0.935 inches

Step 9 Determine the volume of the runoff to be treated from the drainage area to the BMP (i.e., the BMP design volume):

Design volume = Po × A = **(Step 8)** × **(Step 1)** ×1 foot/12 inches

Design Volume = 0.044 acre-feet 0.044 acre-ft x 43,560 sq. ft/acre= 1900 cf

[5] *WEF Manual of Practice No. 23 and the ASCE Manual of Practice No. 87 (1998), pages 175-178.*

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Project Name: Traverse
Job #: 2076-20
Date: 8/14/14
By: EMD

Sample Calculation for Valley Gutters in Alleys

Volume required to be treated = 1900 cf (from Appendix B - Typical Alley Sizing)

Assume 20% void ratio

Volume = $\frac{1900\ cf}{0.20}$ = 9500 cf

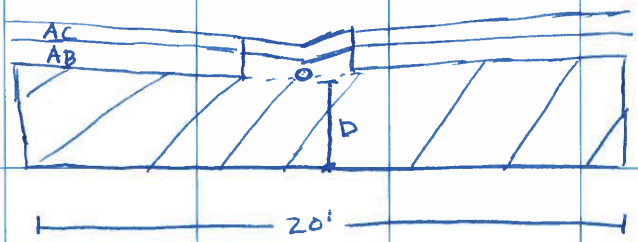
Length of Valley Gutter from Appendix B (worse case) = 390'

$D = \frac{V}{L \times W}$

$D = \frac{9500\ cf}{390' \times 20'}$

D = 1.22'

Design Depth = **1.5'**



Sample Calculation for Pervious Gutter

Volume required to treat typical section = 1.17 cf (Appendix B - Typical Street Section)

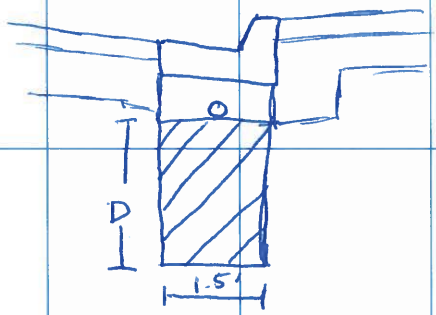
1' wide strip

Assume 40% void ratio

Volume = $\frac{1.17\ cf}{0.40}$ = 2.93 cf

$D = \frac{2.93\ cf}{1.0' \times 1.5'}$

D = 1.95'



Designed Depth = **2.0'**

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Job #: 2076-10
Date: 3/24/14
By: EMD

C.3 Sample Calcs from spreadsheet

Site Values

MAP_{site} = 14.5"

MAP_{gage} = 13.9" (San Jose Airport)

Intensity = 0.2 in/hr

Infiltration = 5.0 in/hr

Correction Factor $CORR = \frac{MAP_{site}}{MAP_{gage}} = \frac{14.5"}{13.9"} = 1.04$

Soil Type: clay (D)

Average Slope: 1% → use figure B-2: unit basin volume for 100% capture - San Jose Airport Gage (1% slope)

Unit Basin Storage Volumes (UBSV)

From figure B-2

UBSV = 0.57"

Sizing for BMP 1-A

Area = 1,210 SF of roof, 100% impervious

Water Quality Design Volume

$V_D = (\text{CORR factor}) \times (\text{UBSV}) \times (\text{Drainage Area}) \times (\frac{1'}{12"} \text{ conversion})$

$V_D = (1.04) \times (0.57") \times (1{,}210\ SF) \times (\frac{1'}{12"})$

V_D = 59.77 CF

Storm Duration

$T = \frac{1\ hr}{0.2\ in} \times 0.57\ in = 2.85\ hr$

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Project Name: Traverse
Job #: 2076-10
Date: 3/24/14
By: EMD

Flow Volume thru Soil

Flow thru planter area = 52 SF (assumed for design)

$$V_{flow} = \left(\frac{BMP}{Area}\right) \times \left(\frac{infiltration}{rate}\right) \times (duration) \times \left(\frac{1'}{12''}\right)$$

$$V_{flow} = (52\ SF) \times (5.0\ in/hr) \times (2.85\ hr) \times \left(\frac{1'}{12''}\right)$$

$$V_{flow} = 61.75\ CF$$

Remaining Ponding Volume

Remaining Volume $V_p = V_{in} - V_{out}$

$$V_p = V_D - V_{flow}$$

$$V_p = 59.77\ CF - 61.75\ CF$$

$V_p = -1.98$ CF (V_p is negative, ∴ no ponding)

$$Depth = \frac{V_p}{A_{Bio}}$$

$$= \frac{-1.98\ CF}{52}$$

Depth is negative, ∴ no ponding

Could reduce size of flow-thru planter to allow 4" max ponding

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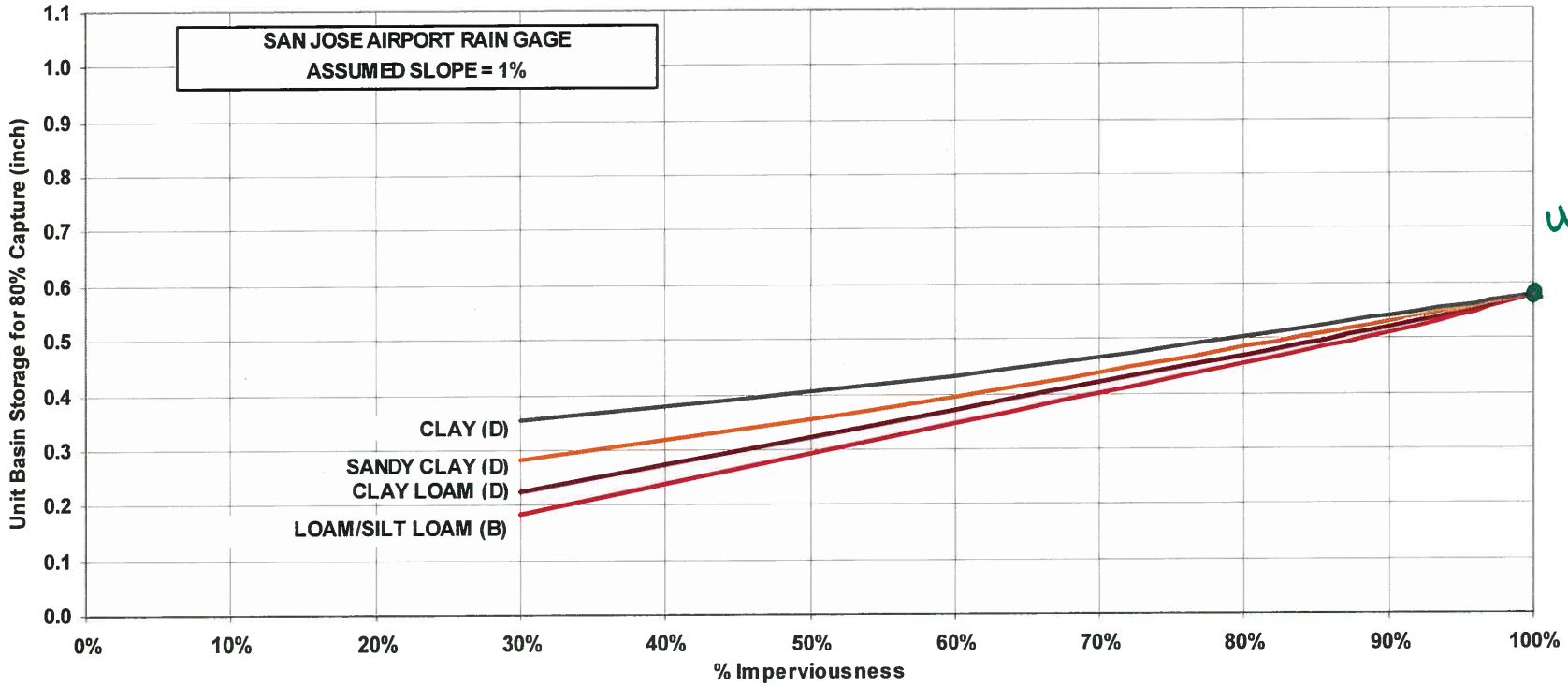
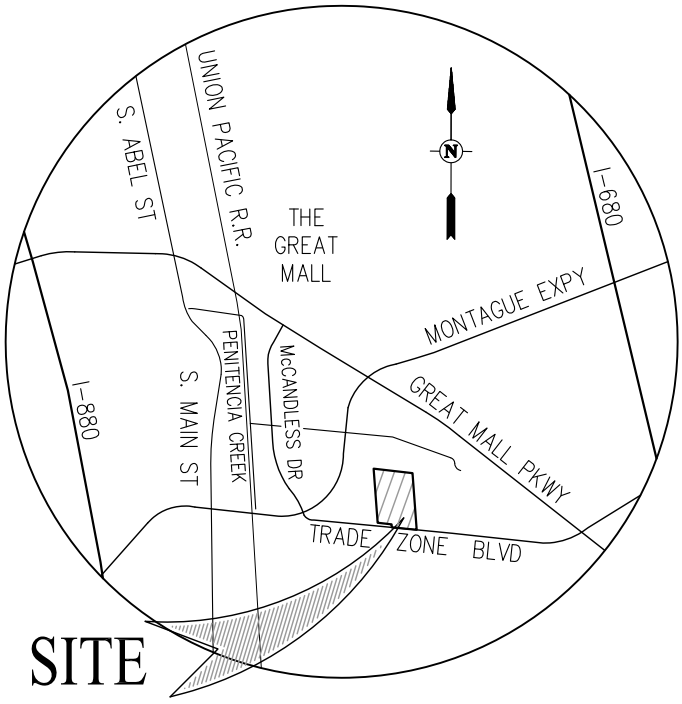


Figure B-2 Unit Basin Volume for 80% Capture - San Jose Airport Rain Gage

Appendix G



VICINITY MAP

(NTS)

FIGURE 1

VICINITY MAP

TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

SCALE: NTS DATE: APRIL 2015

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G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES-PARK\FIGURE 1 - VICINITY MAP.DWG

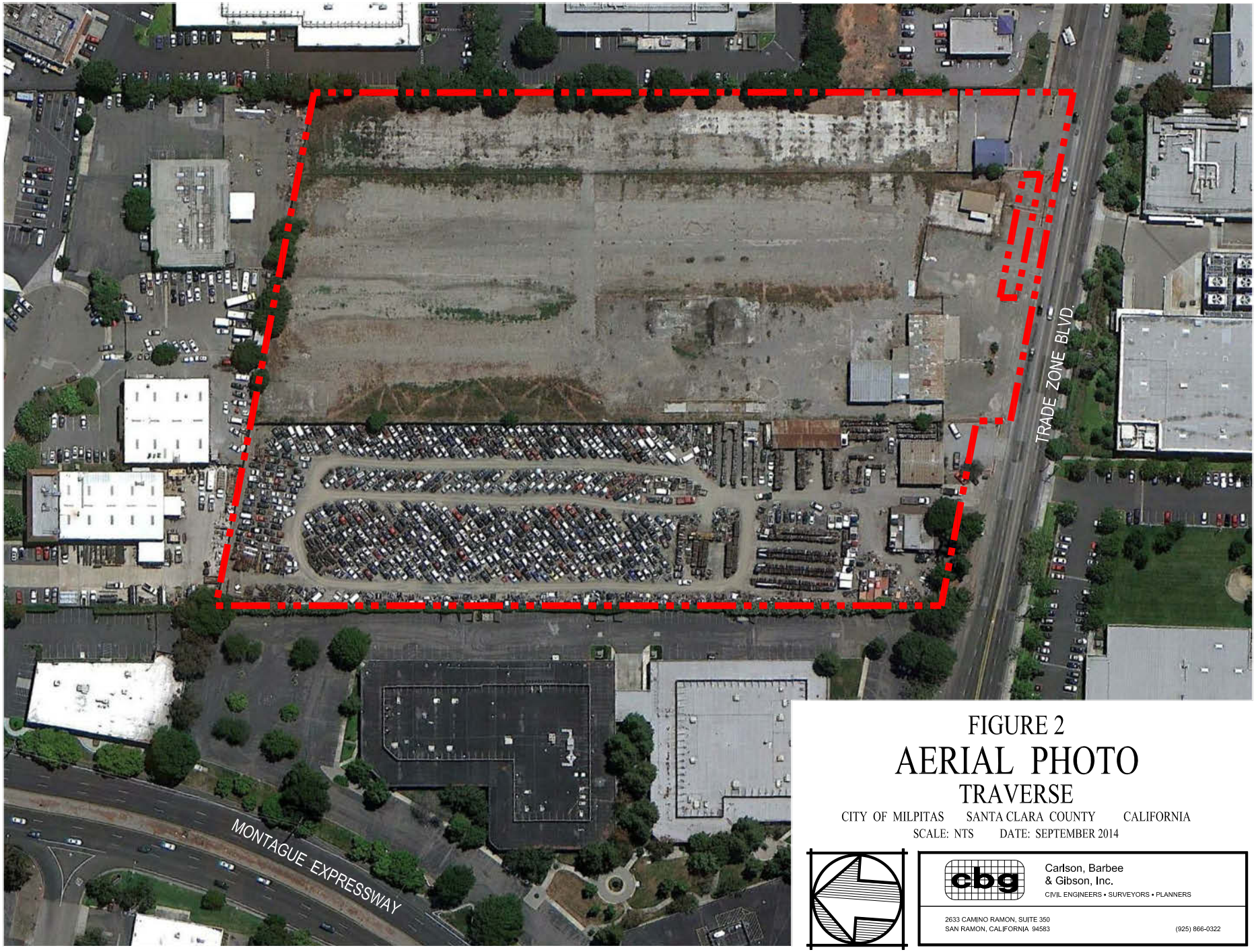

FIGURE 2

AERIAL PHOTO

TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

SCALE: NTS DATE: SEPTEMBER 2014

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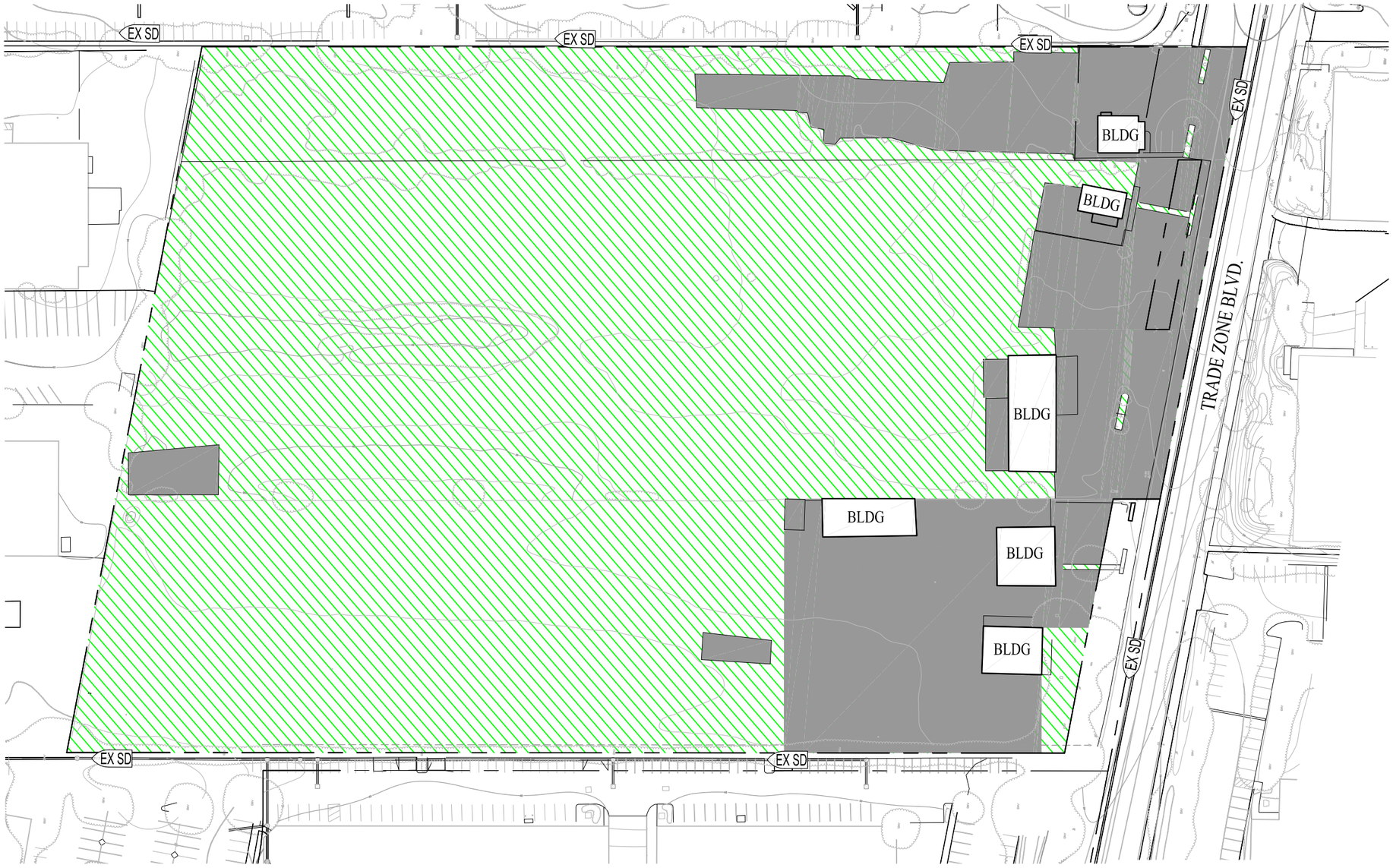
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 2 - AERIAL.DWG



LEGEND

PROJECT BOUNDARY

EXISTING STORM DRAIN

IMPERVIOUS AREA - 24%

PERVIOUS AREA - 76%

EX BUILDING (INCLUDED IN IMPERVIOUS AREA)

NOTES:
1. EXISTING ON-SITE DRIANAGE SYSTEM IS UNKNOWN. LOCATION OF EXISTING FACILITIES TO BE DETERMINED UPON SITE DESIGN.

FIGURE 3
EXISTING CONDITIONS
TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA
SCALE: NTS DATE: SEPTEMBER 2014

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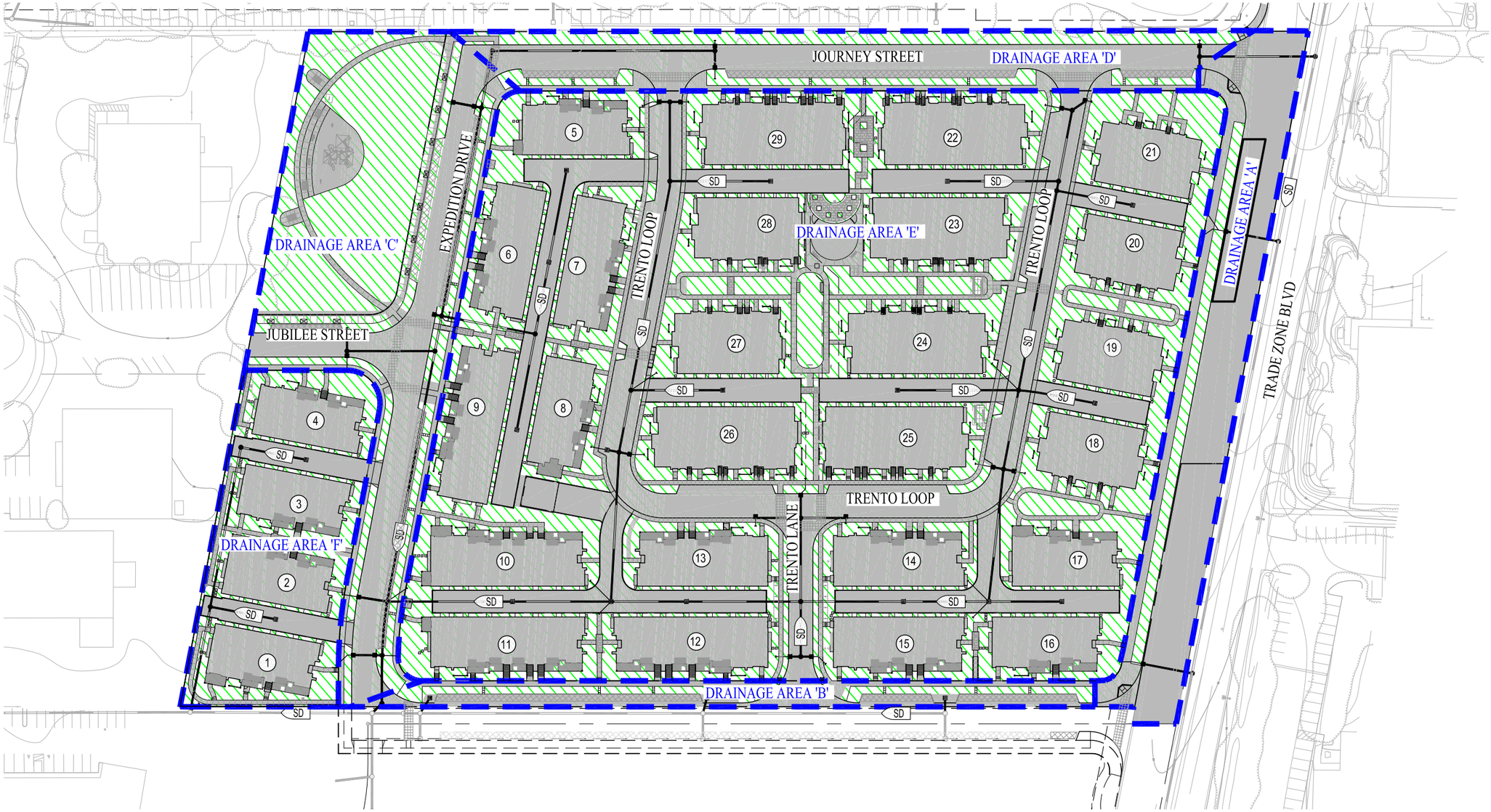
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 3 - EXISTING CONDITIONS.DWG



LEGEND

- PROJECT BOUNDARY
- DRAINAGE AREA
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- (1) BUILDING NUMBER
- IMPERVIOUS AREA - 73%
- PERVIOUS AREA - 27%

FIGURE 4
PROPOSED CONDITIONS
TRAVERSE

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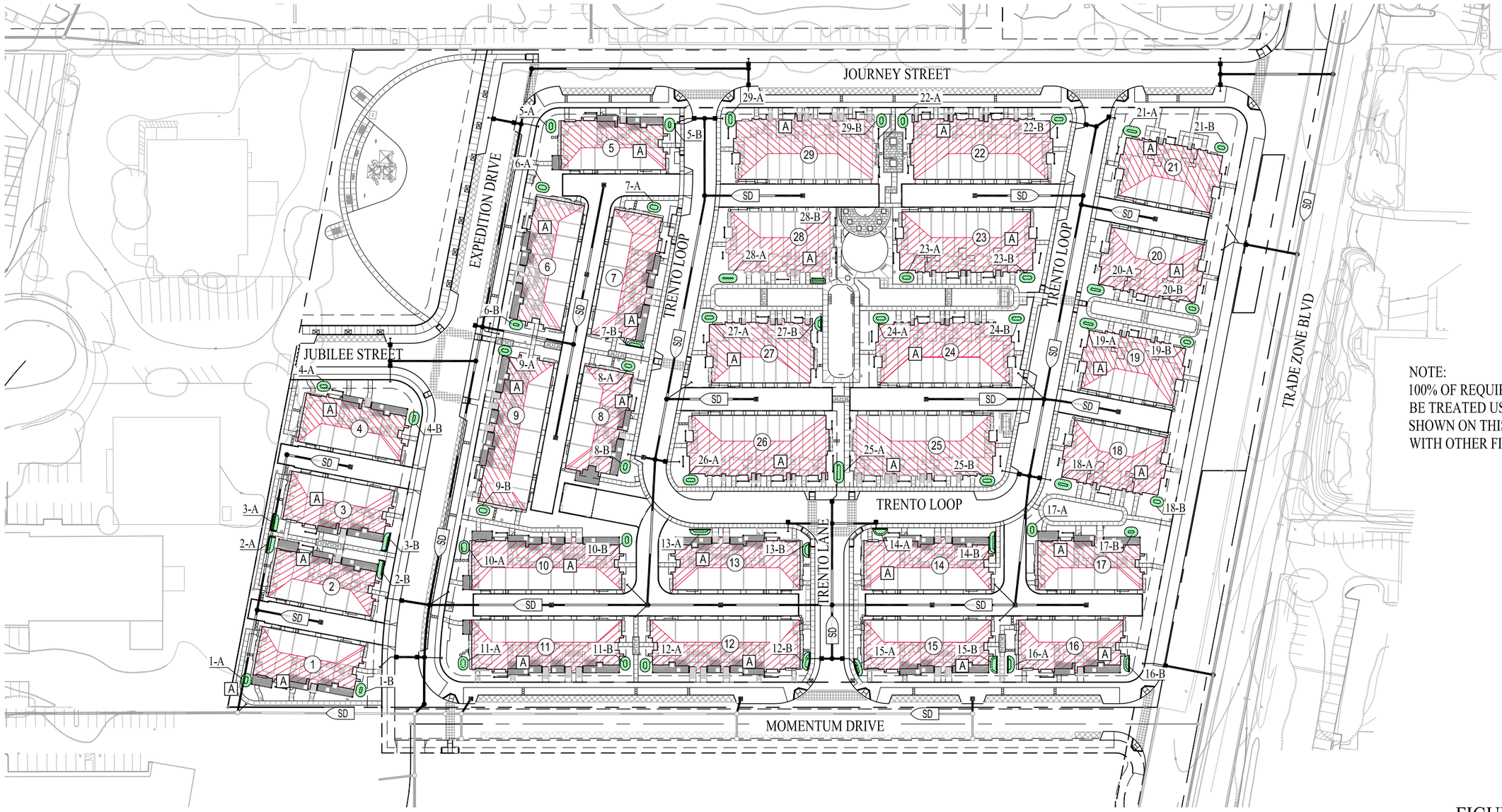
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 4 - PROPOSED CONDITIONS.DWG



NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

LEGEND

- PROJECT BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- (1) BUILDING NUMBER
- DRAINAGE AREA - BUILDING
- FLOW-THROUGH PLANTER
- [A] TREATMENT AREA ID -FLOW-THROUGH PLANTER
- 1-A BMP ID

FIGURE 5
FLOW-THROUGH PLANTER AREAS
TRAVERSE

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G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 5 - FLOW THROUGH PLANTER AREAS.DWG

NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

LEGEND

PROJECT BOUNDARY

EXISTING STORM DRAIN

PROPOSED STORM DRAIN

(1) BUILDING NUMBER

SELF-TREATING & SELF-RETAINING LANDSCAPE AREA - 139,930 SF

SIDEWALK (DRAINS TO SELF-RETAINING LANDSCAPE OR RAINGARDEN INFILTRATION) - 67,000 SF

FIGURE 6
LANDSCAPE TREATMENT AREAS
TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA
SCALE: NTS DATE: SEPTEMBER 2014

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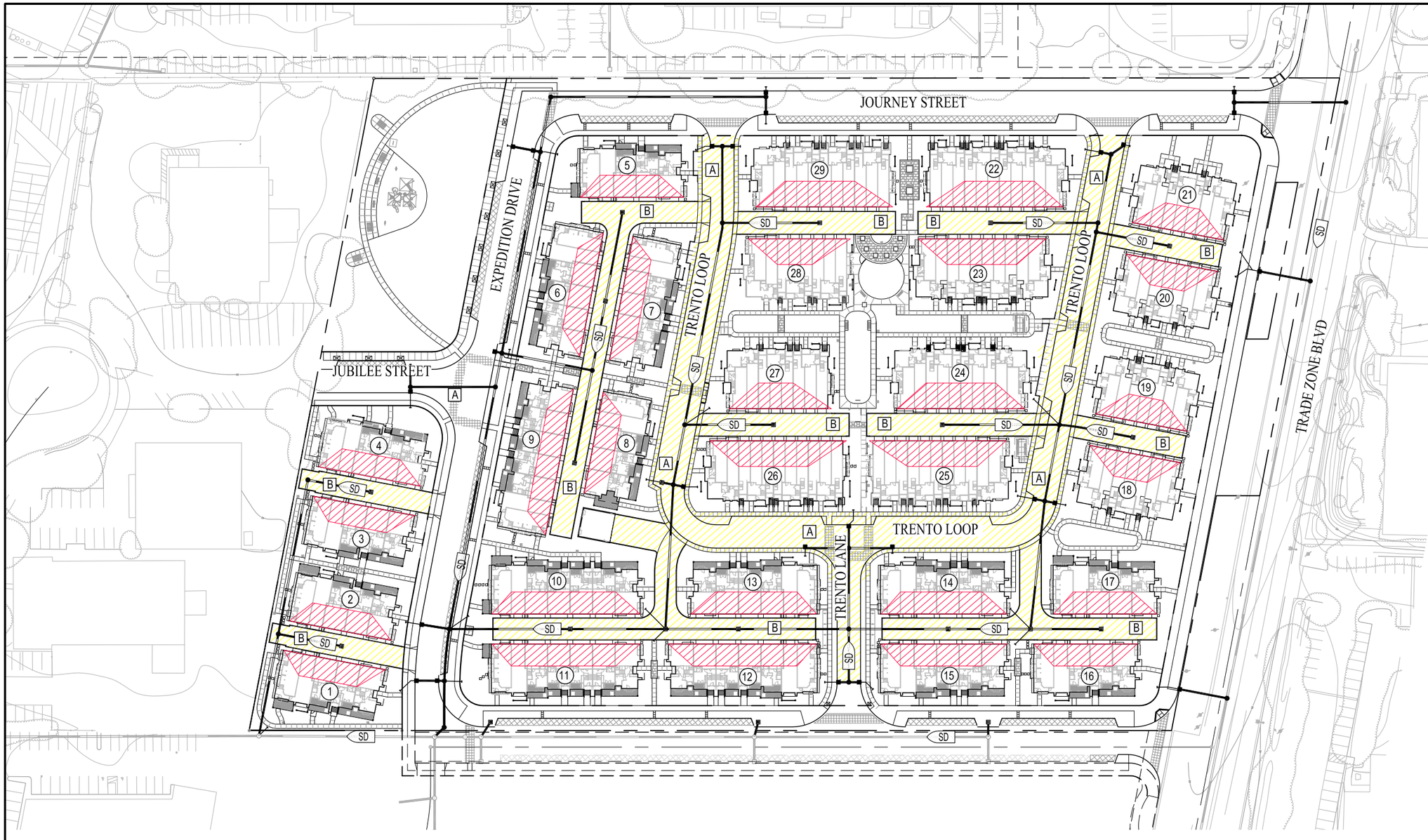
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 6 - LANDSCAPE AREAS.DWG



NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

LEGEND

- PROJECT BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- (1) BUILDING NUMBER
- DRAINAGE AREA - BUILDING
- DRAINAGE AREA - STREET/ALLEY
- [A] TREATMENT AREA ID -PERVIOUS GUTTER
- [B] TREATMENT AREA ID -PERVIOUS VALLEY GUTTER

FIGURE 7
ROADWAY INFILTRATION AREAS
TRAVERSE

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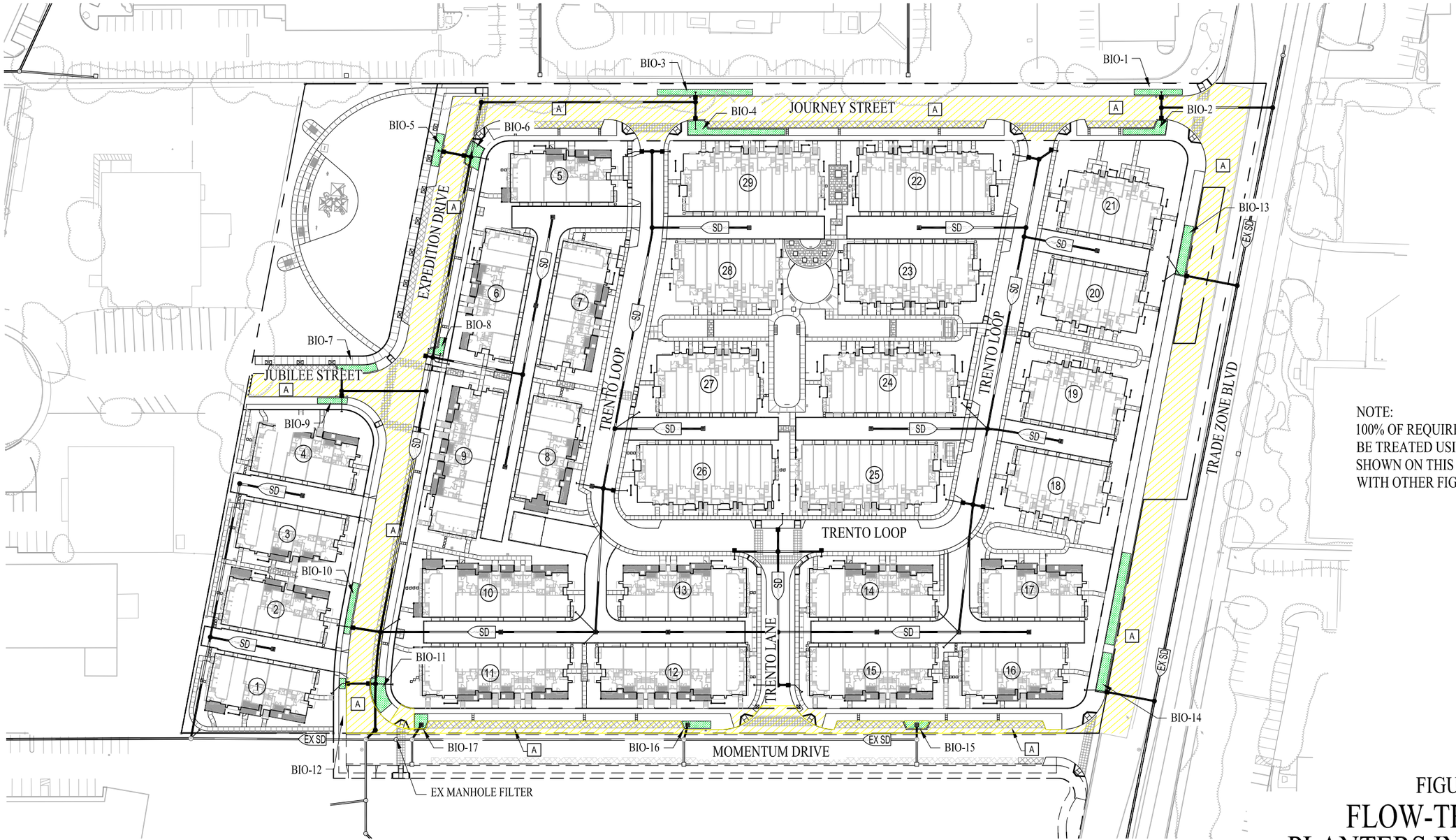
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 7 - ROADWAY INFILTRATION AREAS.DWG



NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

LEGEND

- PROJECT BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- (1) BUILDING NUMBER
- DRAINAGE AREA
- FLOW-THROUGH PLANTER
- [A] TREATMENT AREA ID -FLOW-THROUGH PLANTER
- BIO-1 BMP ID

FIGURE 8
FLOW-THROUGH PLANTERS IN PUBLIC R/W

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G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 8 - BIOTREATMENT PLANTERS AND TREE FILTERS.DWG

Appendix H

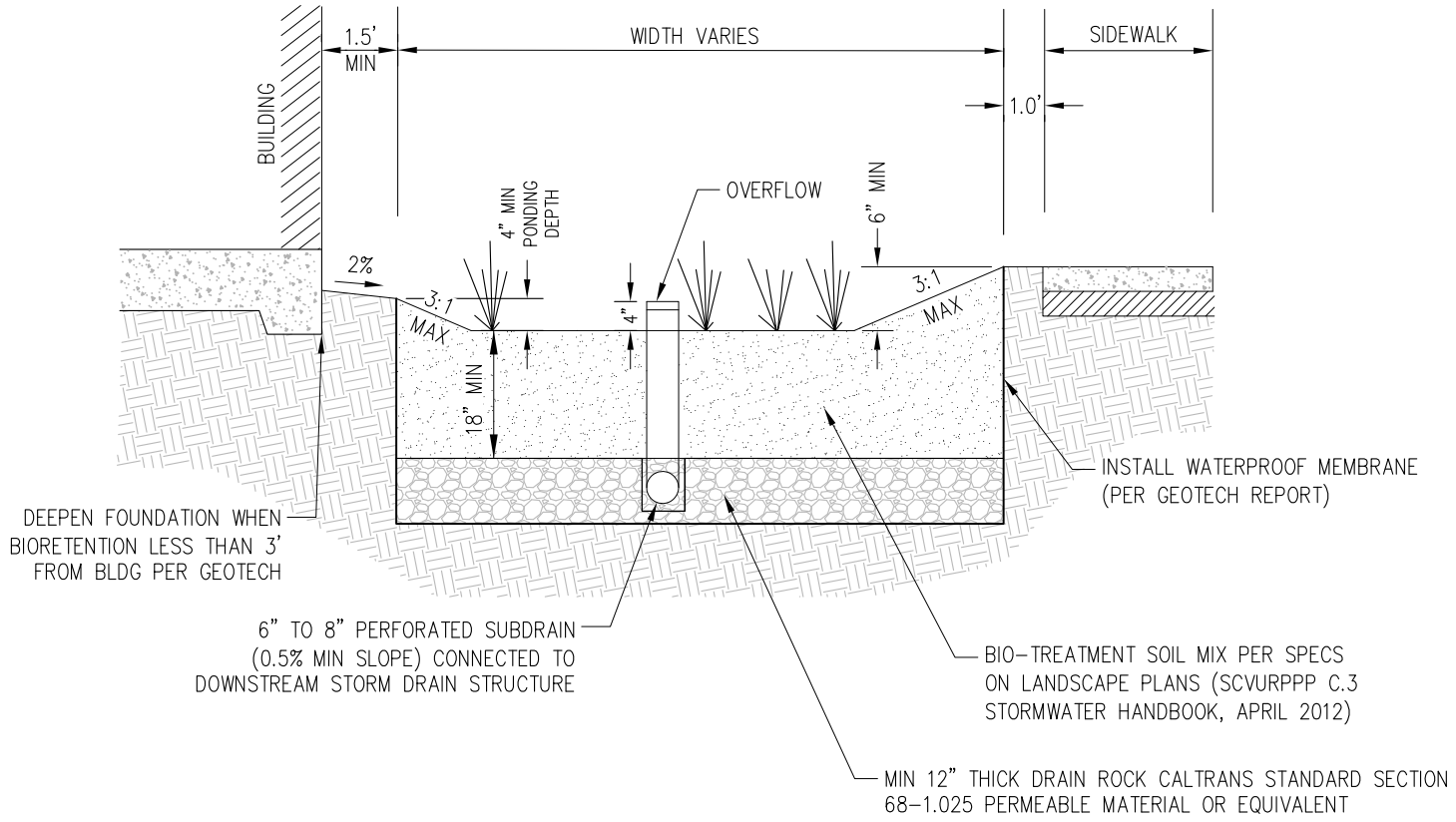

FIGURE 9
FLOW-THROUGH PLANTER (ON-SITE)

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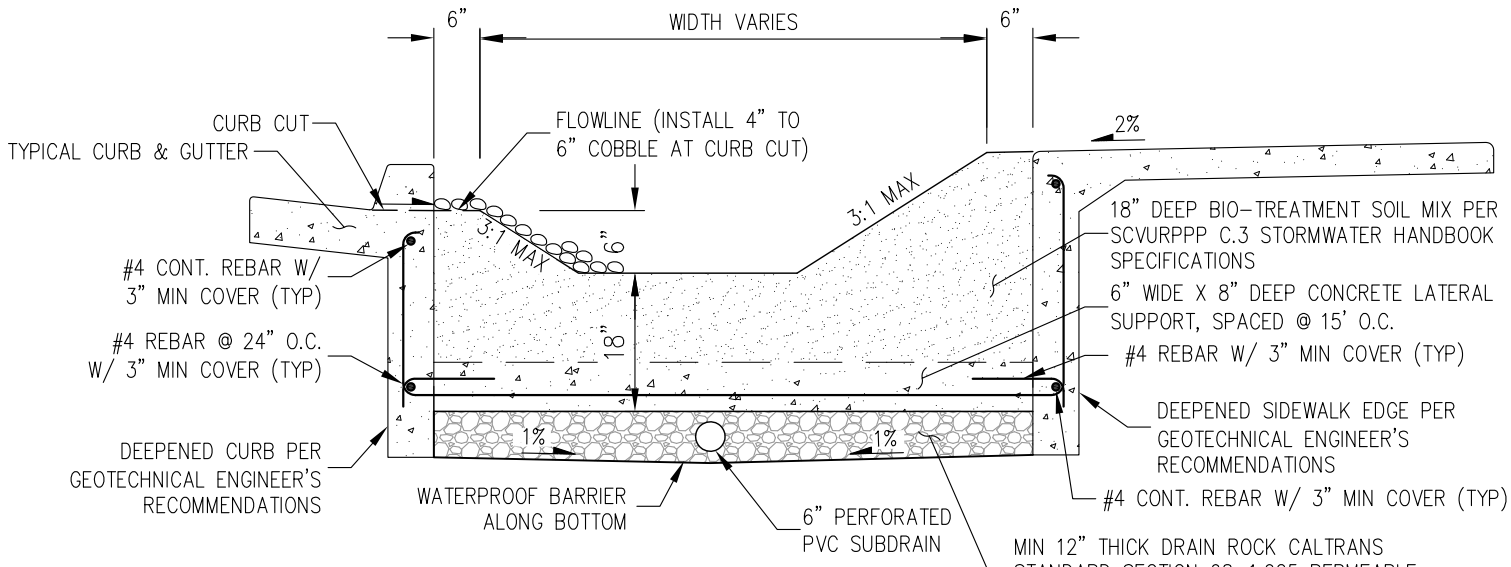
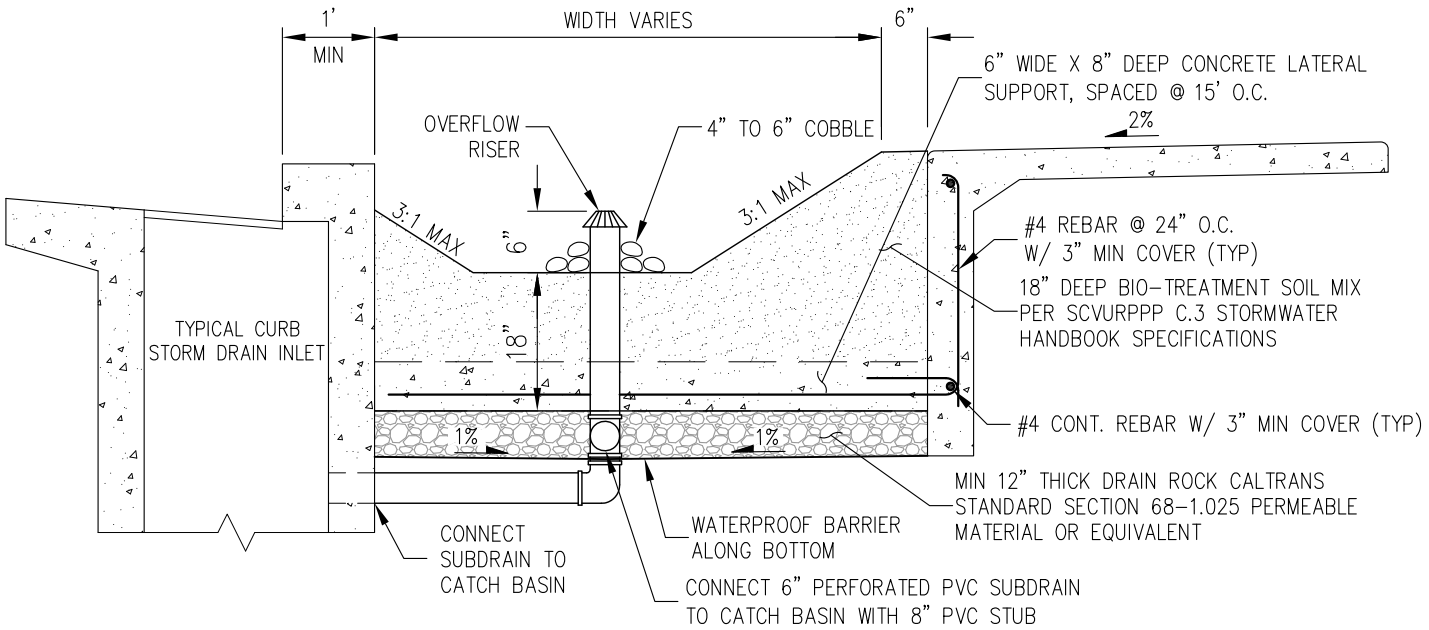


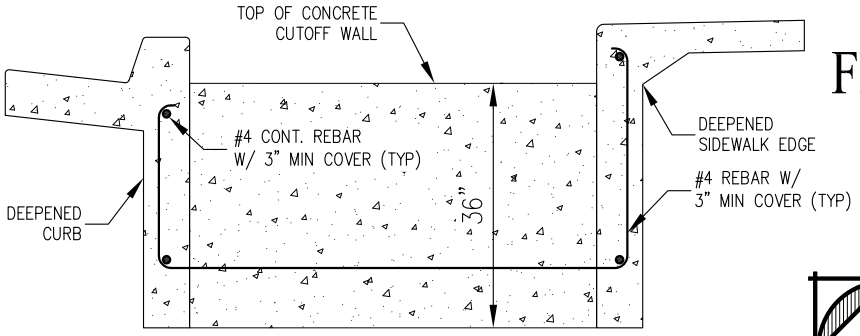
FLOW-THROUGH PLANTER AT CURB CUT

NOT TO SCALE



FLOW-THROUGH PLANTER AT CURB INLET

NOT TO SCALE



TYPICAL CUTOFF WALL

NOT TO SCALE

FIGURE 10

FLOW-THROUGH PLANTER WITHIN PUBLIC R/W

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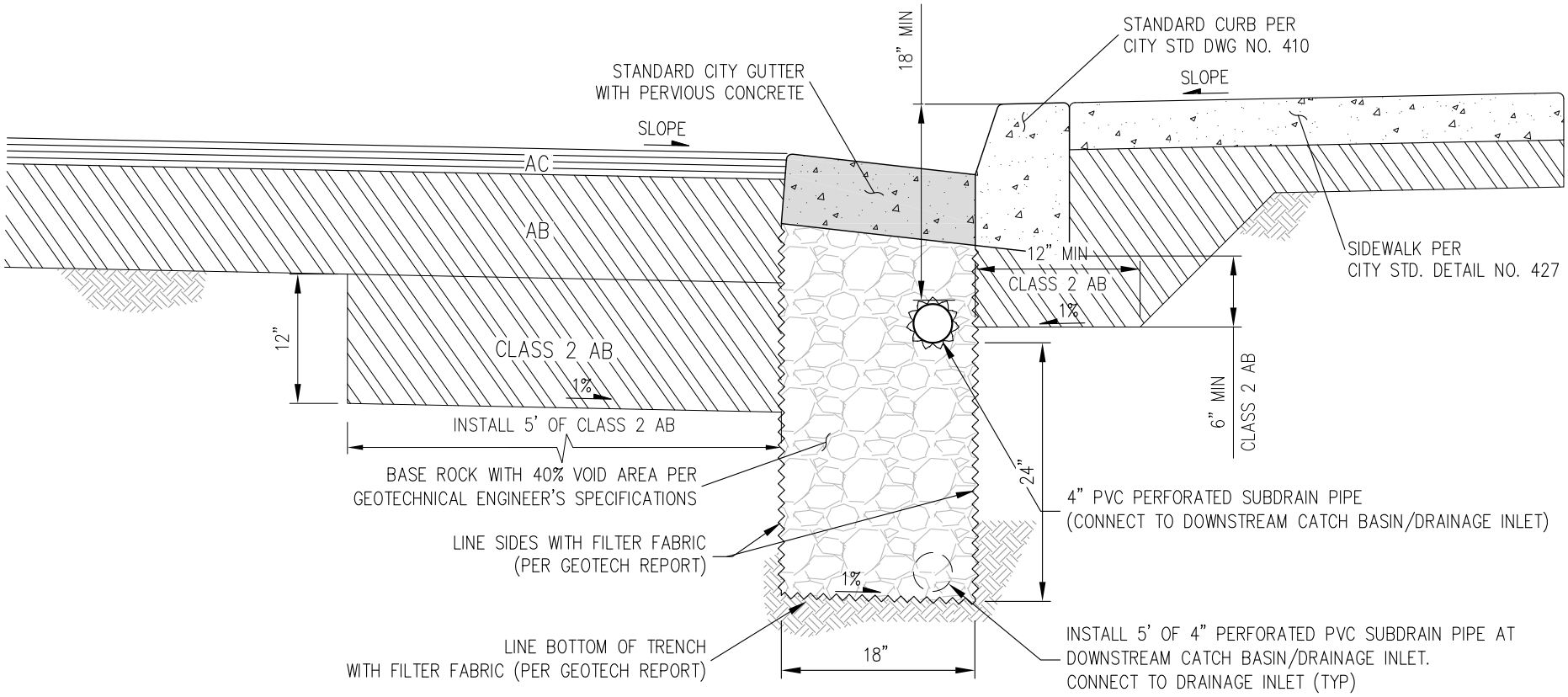
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 10 - BIOTREATMENT DETAIL-PUBLIC.DWG



PERVIOUS CONCRETE GUTTER AND TRENCH DETAIL AT TRENTO LANE & TRENTO LOOP

NOT TO SCALE

FIGURE 11

PERVIOUS GUTTER DETAIL

TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

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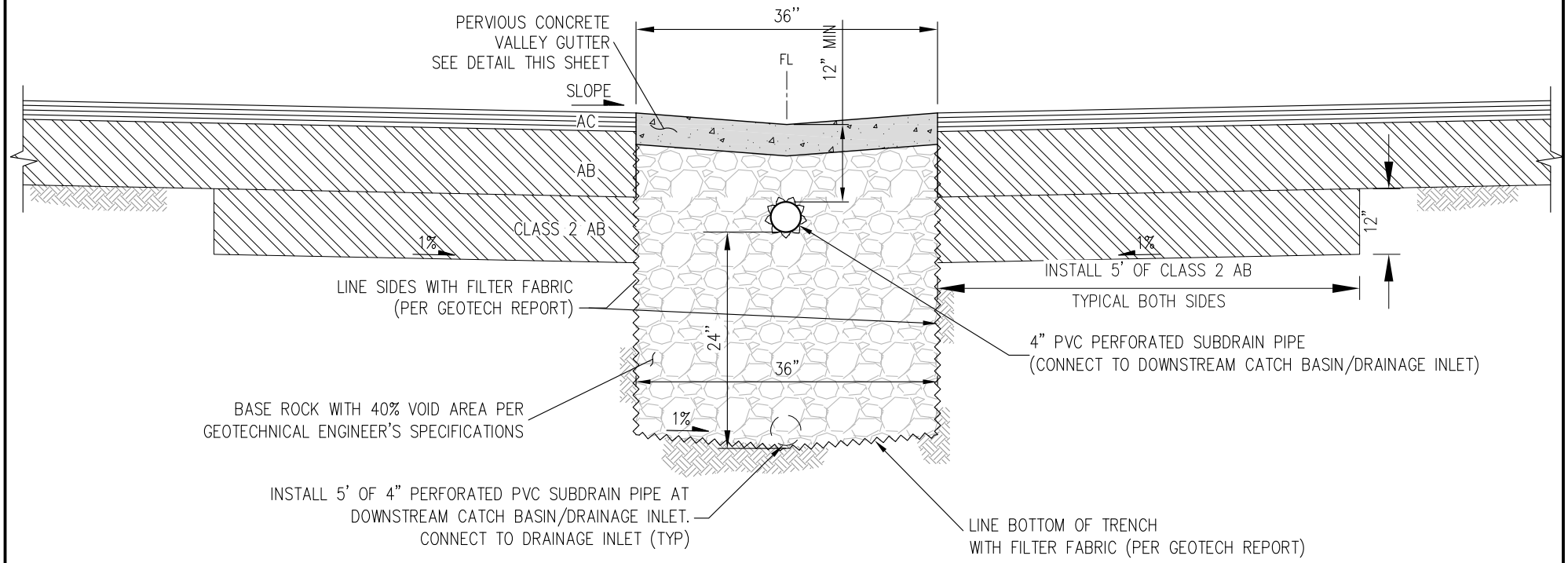
G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 11 - PERVIOUS GUTTER DETAIL.DWG



NOTE:
SLOPE BOTTOM OF TRENCH AT 1% MIN.

FIGURE 12
PERVIOUS VALLEY GUTTER AT PARKING BAYS

TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

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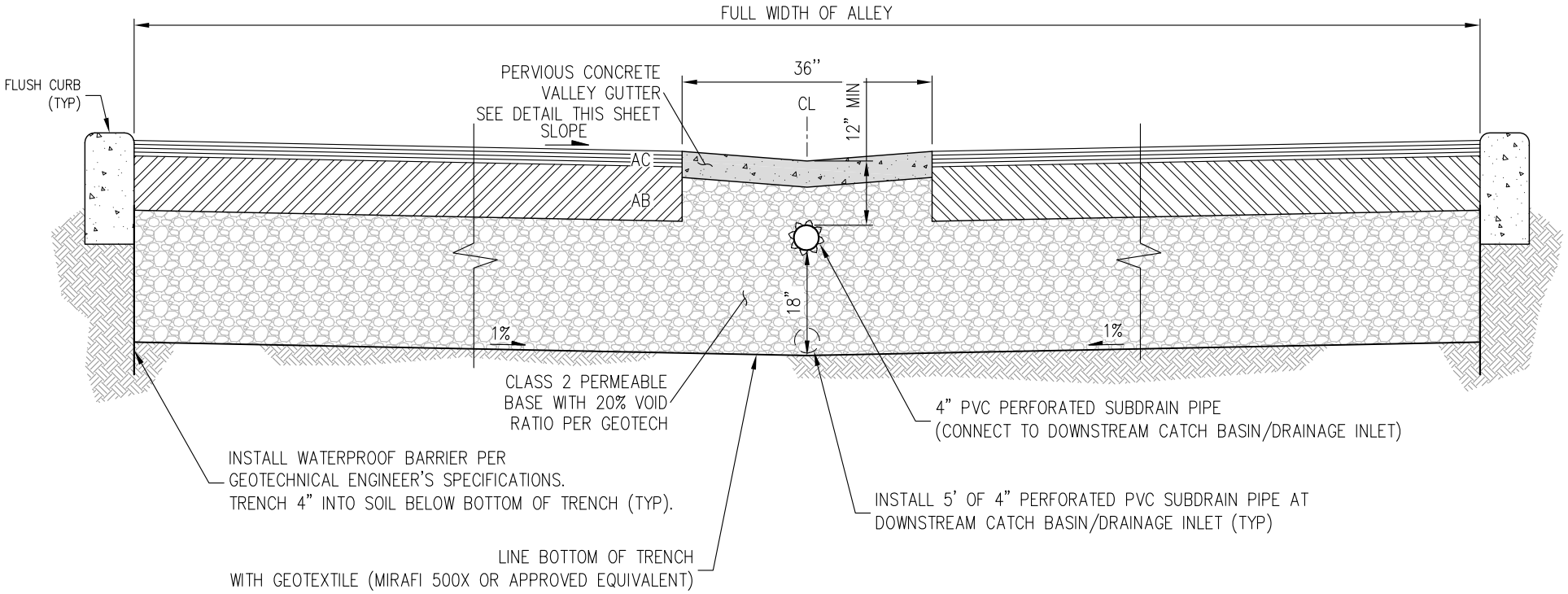

NOTE:
SLOPE BOTTOM OF TRENCH AT 1% MIN.

FIGURE 13
PERVIOUS VALLEY GUTTER AT ALLEYS

TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

SCALE: NTS DATE: SEPTEMBER 2014

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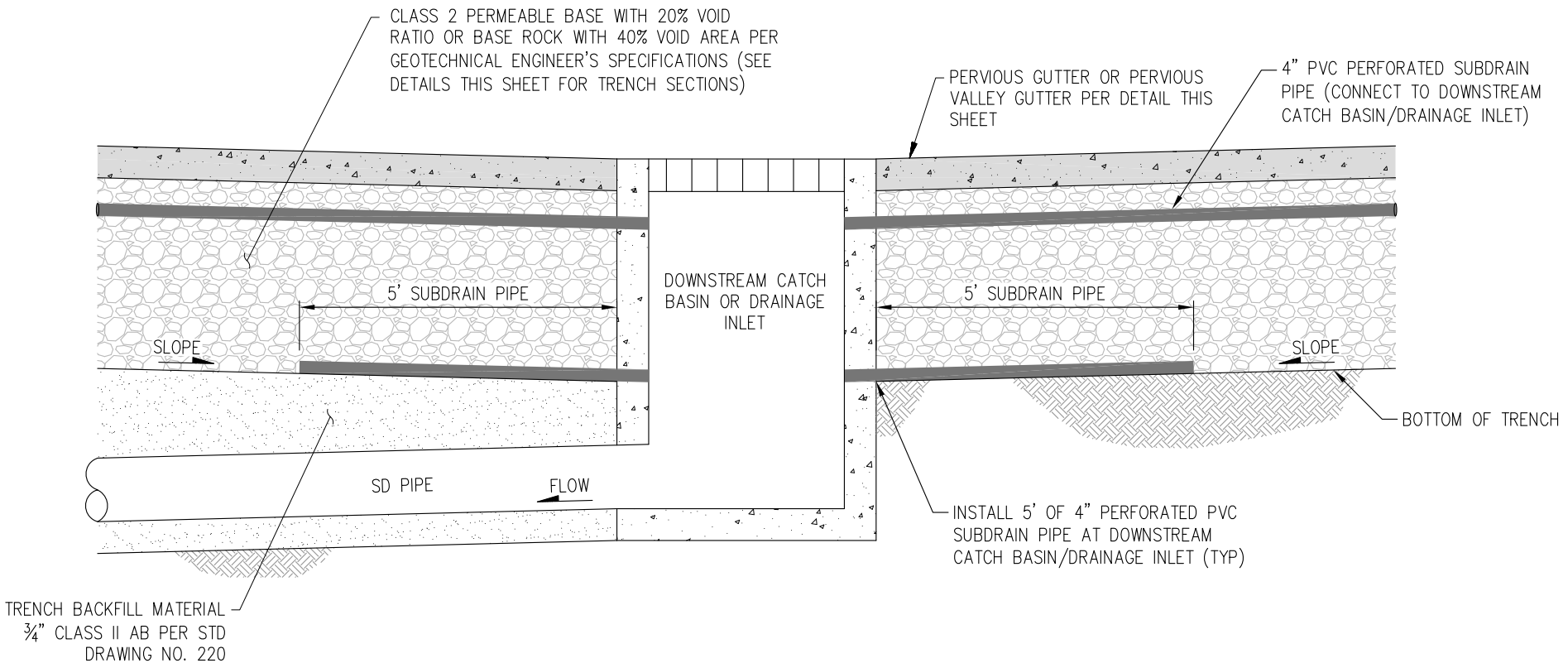

FIGURE 14
TYPICAL SUBDRAIN CONNECTION

TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

SCALE: NTS DATE: SEPTEMBER 2014

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Appendix I

Operation and Maintenance Plan for Stormwater Systems

TRAVERSE

MILPITAS, CALIFORNIA

January 2015

Prepared by:

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

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TABLE OF CONTENTS

Appendix

I. Inspection and Maintenance Log

Stormwater Treatment Measure Operation and Maintenance
Inspection Report to the City of Milpitas, California

This report and attached Inspection and Maintenance Checklists document the inspection and maintenance conducted for the identified stormwater treatment measure(s) subject to the Maintenance Agreement between the City and the property owner during the annual reporting period indicated below.

I. Property Information:

Property Address of APN: 601 Trade Zone Boulevard

Property Owner: K Hovnanian Homes

II. Contact Information:

Name of person to contact regarding this report: Aaron Schwartz

Phone number of contact person: (916) 825 - 8371 E-mail: aschwartz@khov.com

Address to which correspondence regarding this report should be directed:

1375 Exposition Boulevard, Suite 102

Sacramento, CA 95815

III. Reporting Period:

This report, with the attached completed inspection checklists, documents the inspections and maintenance of the identified treatment measures during the time period from _____ to _____.

IV. Stormwater Treatment Measure Information:

The following stormwater treatment measures (identified treatment measures) are located on the property identified above and are subject to the Maintenance Agreement:

Identifying Number of Treatment Measure	Type of Treatment Measure	Location of Treatment Measure on the Property
1-A to 29B	Bioretention	On-Site Bioretention Facilities
B10-1 to B10-17	Bioretention	Bioretention Facilities within Public Right-of Way

V. Summary of Inspections and Maintenance:

Summarize the following information using the attached Inspection and Maintenance Checklists:

Identifying Number of Treatment Measure	Date of Inspection	Operation and Maintenance Activities Performed and Date(s) Conducted	Additional Comments

VI. Sediment Removal:

Total amount of accumulated sediment removed from the stormwater treatment measure(s) during the reporting period: _____ cubic yards.

How was sediment disposed?

☐ landfill

☐ other location on-site as described in and allowed by the maintenance plan

☐ other, explain _____

VII. Inspector Information:

The inspections documented in the attached Inspection and Maintenance Checklists were conducted by the following inspector(s):

Inspector Name and Title	Inspector's Employer and Address

VIII. Certification:

I hereby certify, under penalty of perjury, that the information presented in this report and attachments is true and complete:

_____ _____
Signature of Property Owner or Other Responsible Party Date

Aaron Schwartz
Type or Print Name

K Hovnanian Homes
Company Name

1375 Exposition Boulevard, Suite 102
Address

(916) 825 - 8371 aschwartz@khov.com
Phone number E-mail

Bioretention Area Maintenance Plan for
Traverse

February 3, 2015

Project Address and Cross Streets Trade Zone Boulevard and Momentum Way

Assessor's Parcel No.: _____

Property Owner: K Hovnanian Homes Phone No.: (916) 825 – 8371

Designated Contact: Aaron Schwartz Phone No.: (916) 825 – 8371

Mailing Address: _____

The property contains 74 bioretention area(s), located as described below and as shown in the attached site plan[1].

- ■ **Bioretention Areas 1-A to 29-B** are located On-Site.
- ■ **Bioretention Areas B10-1 to B10-17** are located within the Public Right-of-Way.

I. Routine Maintenance Activities

The principal maintenance objective is to prevent sediment buildup and clogging, which reduces pollutant removal efficiency and may lead to bioretention area failure. Routine maintenance activities, and the frequency at which they will be conducted, are shown in Table 1.

Table 1
Routine Maintenance Activities for Bioretention Areas

No.	Maintenance Task	Frequency of Task
1	Remove obstructions, debris and trash from bioretention area and dispose of properly.	Monthly, or as needed after storm events
2	Inspect bioretention area for ponded water. If ponded water does not drain within 2-3 days, till and replace the surface soil and replant.	Monthly, or as needed after storm events
3	Inspect inlets for channels, soil exposure or other evidence of erosion. Clear obstructions and remove sediment.	Monthly, or as needed after storm events
4	Remove and replace all dead and diseased vegetation.	Twice a year
5	Maintain vegetation and the irrigation system. Prune and weed to keep bioretention area neat and orderly in appearance. Remove and or replace any dead plants.	Twice a year
6	Check that mulch is at appropriate depth (2 inches per soil specifications) and replenish as necessary before wet season begins.	Monthly
7	Inspect the energy dissipation at the inlet to ensure it is functioning adequately, and that there is no scour of the surface mulch.	Annually, before the wet season begins
8	Inspect bioretention area using the attached inspection checklist.	Monthly, or after large storm events, and after removal of accumulated debris or material

[1] Attached site plan must match the site plan exhibit to Maintenance Agreement.

II. Use of Pesticides

The use of pesticides and quick release fertilizers shall be minimized, and the principles of integrated pest management (IPM) followed:

1. Employ non-chemical controls (biological, physical and cultural controls) before using chemicals to treat a pest problem.
2. Prune plants properly and at the appropriate time of year.
3. Provide adequate irrigation for landscape plants. Do not over water.
4. Limit fertilizer use unless soil testing indicates a deficiency. Slow-release or organic fertilizer is preferable. Check with municipality for specific requirements.
5. Pest control should avoid harming non-target organisms, or negatively affecting air and water quality and public health. Apply chemical controls only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, apply the least toxic and the least persistent pesticide that will provide adequate pest control. Do not apply pesticides on a prescheduled basis.
6. Sweep up spilled fertilizer and pesticides. Do not wash away or bury such spills.
7. Do not over apply pesticide. Spray only where the infestation exists. Follow the manufacturer's instructions for mixing and applying materials.
8. Only licensed, trained pesticide applicators shall apply pesticides.
9. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides into runoff. With the exception of pre-emergent pesticides, avoid application if rain is expected.
10. Unwanted/unused pesticides shall be disposed as hazardous waste.

III. Vector Control

Standing water shall not remain in the treatment measures for more than five days, to prevent mosquito generation. Should any mosquito issues arise, contact the Santa Clara Valley Vector Control District (District). Mosquito larvicides shall be applied only when absolutely necessary, as indicated by the District, and then only by a licensed professional or contractor. Contact information for the District is provided below.

Santa Clara Valley Vector Control District
1580 Berger Dr.
San Jose, California 95112
Phone: (408) 918-4770 / (800) 675-1155 - Fax: (408) 298-6356
www.sccgov.org/portal/site/vector

IV. Inspections

The attached Bioretention Area Inspection and Maintenance Checklist shall be used to conduct inspections monthly (or as needed), identify needed maintenance, and record maintenance that is conducted.

Bioretention Area
Inspection and Maintenance Checklist

Property Address: 601 Trade Zone Boulevard Property Owner: K Hovnanian Homes

Treatment Measure No.: _____ Date of Inspection: _____ Type of Inspection: ☐ Monthly ☐ End of Wet Season

Inspector(s): _____ ☐ After heavy runoff ☐ Other: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected When Maintenance Is Performed
1. Standing Water	Water stands in the bioretention area between storms and does not drain within 2-3 days after rainfall.			There should be no areas of standing water once storm event has ceased. Any of the following may apply: sediment or trash blockages removed, improved grade from head to foot of bioretention area, or added underdrains.
2. Trash and Debris Accumulation	Trash and debris accumulated in the bioretention area.			Trash and debris removed from bioretention area and disposed of properly.
3. Sediment	Evidence of sedimentation in bioretention area.			Material removed so that there is no clogging or blockage. Material is disposed of properly.
4. Erosion	Channels have formed around inlets, there are areas of bare soil, and/or other evidence of erosion.			Obstructions and sediment removed so that water flows freely and disperses over a wide area. Obstructions and sediment are disposed of properly.
5. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.
6. Mulch	Mulch is missing or patchy in appearance. Areas of bare earth are exposed, or mulch layer is less than 2 inches in depth.			All bare earth is covered, except mulch is kept 6 inches away from trunks of trees and shrubs. Mulch is even in appearance, at a depth of 2 inches.
7. Miscellaneous	Any condition not covered above that needs attention in order for the bioretention area to function as designed.			Meets the design specifications.

II. Updates, Revisions and Errata

Future updates, revisions and errata shall be listed in this section.

III. Introduction

This Stormwater Control Plan for the Traverse residential development is submitted to the Department of Public Works of the City of Milpitas (City) as a recommendation on the use of permanent Best Management Practices (BMPs) on the site. Probable design storm flows and permanent BMP selection are presented in this report. BMP technical requirements are located in the Stormwater C.3 Guidebook 3rd Edition adopted by the City of Milpitas on October 6, 2005.

The Traverse project site is located north of Trade Zone Boulevard between Montague Expressway and Lundy Ave. Trade Zone Boulevard borders the site to the south. On the north and east, the project is bordered by existing industrial buildings. The approved development project called Pace and the associated Momentum Drive borders the project site to the west. The improvements to the 12.5± acre site will include 29 multi-story buildings, public and private roadways, a public park, private common areas, and landscaped paseos.

Upon construction of the proposed improvements, approximately 9.1 acres (73%) of the site will be covered by impervious surface and about 3.4 acres (27%) will be covered by landscaped areas including lawns, shrubs, and trees. All walkways within these areas will be sloped to drain onto the surrounding landscaping. The proposed site conditions are shown in Figure 1.

The site can be divided into six principle drainage areas (See Figure 1)

- *Drainage Area 'A'* – Approximately 0.8 acres on Trade Zone Blvd. This roadway area will discharge into the existing storm drain line in Trade Zone Blvd. This area will be treated through flow-through planters before entering the storm drain system.

- *Drainage Area 'B'* – Approximately 0.3 acres on the western frontage. This portion of roadway associated with this project will widen the existing Momentum Drive constructed with the Pace project, and will add parking bays, landscape strip, and sidewalk. This drainage area will be treated through flow-through planters which will connect to the existing storm drain system.

- *Drainage Area 'C'* – Approximately 1.6 acres of the proposed Expedition Drive and the Public Park. These areas will be treated via several flow-through planters which will then be connected to this storm drain system.

- *Drainage Area 'D'* – Approximately 0.8 acres on the eastern frontage will be a new public road called Journey Street. This roadway drainage will be directed to several flow-through planters which will then be connected to the proposed storm drain system.

- *Drainage Area 'E'* – Approximately 8.1 acres of the private "center" of the site will discharge into the existing storm drain system in the existing Momentum Drive. This drainage will be treated through a variety of measures onsite before entering the public system in Momentum Drive.

- *Drainage Area 'F'* – Approximately 0.9 acres of the most northwest corner of the site will discharge into the existing storm drain system north of Momentum Drive as well. This drainage will be treated through a variety of measures onsite before entering the existing storm drain pipe in the northwest corner of the project site.

Drainage Areas 'A', 'B', 'C', and 'D' are located in the public right-of-way and are to be maintained by the city of Milpitas. The Traverse Homeowners Association is only responsible for the Operation & Maintenance of Drainage Areas 'E' and 'F'.

The treatment BMPs used on this site include:

- Bio-Retention Planters
- Infiltration Trenches under Pervious Concrete Gutters and Valley Gutters
- Landscape Areas (Self-Treating, Self- Retaining)

IV. Responsibility for Maintenance

A. General

1. Contact Information

Designation of Individuals Responsible for Storm Water Treatment BMP Operation and Maintenance

Date Completed: 2014
Facility Name: Traverse Residential Development
Facility Address: 601 Trade Zone Blvd

Designated Contact for Operation and Maintenance
Primary Contact: Traverse Homeowners Association
Telephone: (916) 925-9500
Email: infosac@vierramoore.com

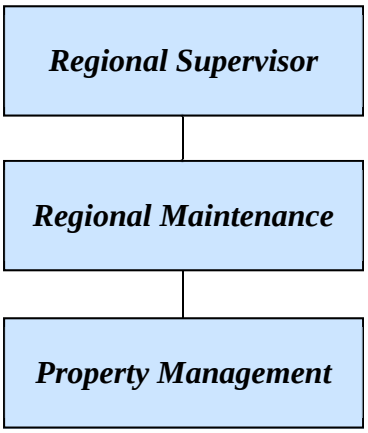
Off-Hours or Emergency Contact
Primary Contact: Aaron Schwartz
Telephone: (916) 825-8371
Alternate Telephone: (916) 349-4051
Email: ASchwartz@KHov.com

Corporate Officer (Authorized to Execute Contracts with City)
Primary Contact: Joe Killinger
Title or Position: Authorized Signatory
Telephone: (916) 349-4031
Email: JKillinger@KHov.com

IV. Responsibility for Maintenance

A. General

2. Organization Chart



3. O&M Agreement

An operation and maintenance agreement between the Owner and City of Milpitas will be recorded with the County of Santa Clara.

4. Maintenance Funding

a. *Sources of funds for maintenance:* Maintenance funds will be paid by the Traverse Homeowner's Association.

b. *Budget category or line item:* Funds for the maintenance of the BMPs will be listed under the "Maintenance Contracts" line item in the Traverse Homeowner's Association.

c. *Description of procedure and process for ensuring adequate funding for maintenance:* The cost of maintenance operations shall be covered by the Traverse Homeowner's Association.

IV. Responsibility for Maintenance

B. Resident Training

Per Condition of Approval #73, the homeowners association will provide an orientation to new homeowners on the project's Stormwater Control Plan, non-point source pollution control measures, and secure their written commitment to participate in the plan where applicable.

C. Staff Training Program

Employees will be trained to comply with the terms of the Operations and Maintenance Agreement to be recorded. Employees will be trained in the proper disposal of trash materials and hazardous waste. Employees will be trained to comply with the storm water inlet labels printed with the logo "No Dumping / Flows to Bay." This educational measure is intended to prevent unlawful dumping of waste materials, such as motor oil, into the storm drain system.

D. Records

The Traverse Homeowners Association will maintain annual records of the operation and maintenance of the structural BMP units. The records will consist of annual inspection reports and certificates of compliance provided by the maintenance company contracted to service the structural BMP units. The reports will be available to the City inspector upon request.

Per Condition of Approval #75, to ensure proper function, drain inlets and treatment control devices will need to be cleaned a minimum of once a year, and inspected a minimum of two times per year.

V. Summary of Drainage Areas and BMPs

A. Drainage Areas

1. Approximately 9.1 acres (73%) of the site is covered by impervious surface and about 3.4 acres (27%) is covered by landscaping or other pervious surfaces.

2. The following drainage areas are to be maintained by the Traverse Homeowners Association.
(See Figures 1):

   - *Drainage Area 'E'* – Approximately 8.1 acres of the private "center" of the site will discharge into the existing storm drain system in the existing Momentum Drive. This drainage will be treated through a variety of measures onsite before entering the public system in Momentum Drive.

   - *Drainage Area 'F'* – Approximately 0.9 acres of the most northwest corner of the site will discharge into the existing storm drain system north of Momentum Drive as well. This drainage will be treated through a variety of measures onsite before entering the existing storm drain pipe in the northwest corner of the project site.

Drainage Areas 'A,' 'B,' 'C,' and 'D' are to be maintained by the City of Milpitas and are not part of this Operation and Maintenance Plan.

B. Treatment BMPs

The treatment BMPs used on this site include:

1. *Bio-Retention Planters:* Bio-Retention planters will be constructed throughout the site. These features use a combination of vegetated buffers, ponding, permeable planting soils, infiltration materials and sub-drains systems. They are designed to filter pollutants from stormwater runoff from adjacent roof areas and other impervious surfaces.

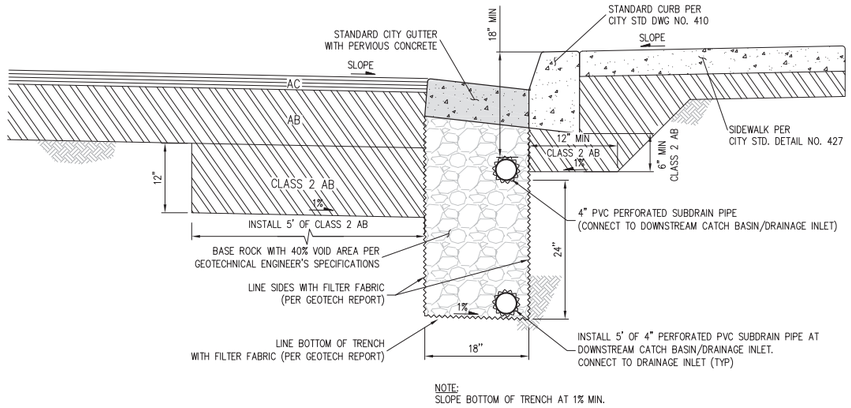
2. *Infiltration Trenches:* In designated areas, infiltration trenches will be constructed to allow stormwater runoff to infiltrate into the native soils. These trenches will collect the runoff through a pervious concrete gutter system and store the water for infiltration with crushed rock. An overflow collection pipe will be placed at the top of the trench to direct excess water directly into the storm drain system.

3. *Landscape Areas:* Landscape areas are located adjacent to sidewalks and other impervious areas, allowing self-treatment of the associated runoff. Drainage from sidewalks that is directed to landscape areas provides treatment via evapotranspiration and infiltration.

VI. BMP Design Documentation

A. "As-Built" Drawings of Each BMP

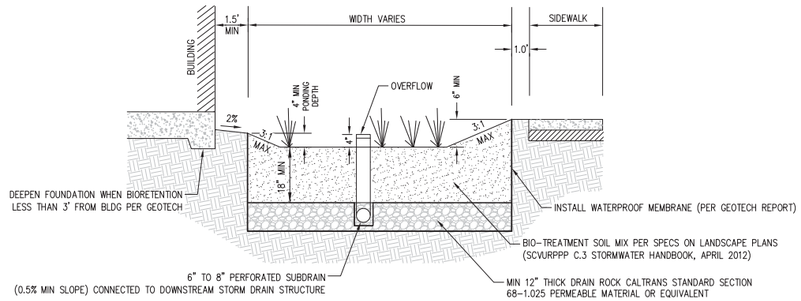
See attached details and sections.



NOTE:
SLOPE BOTTOM OF TRENCH AT 1% MIN.

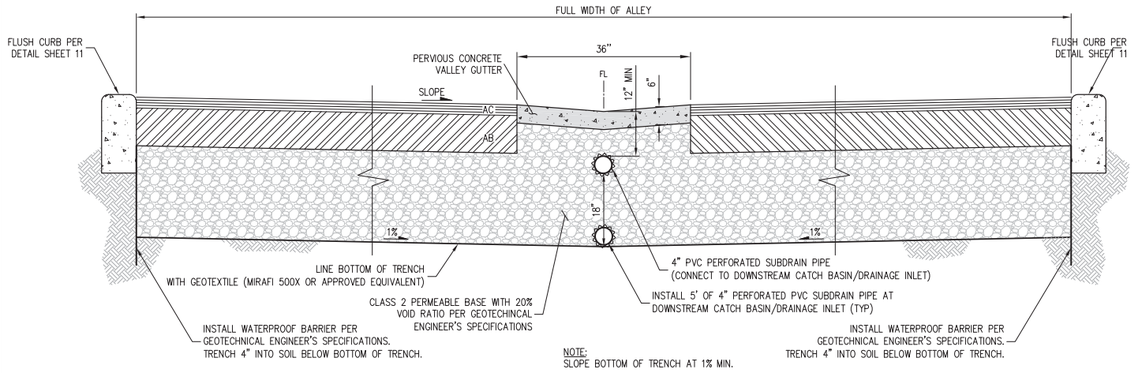
PERVIOUS CONCRETE GUTTER AND TRENCH DETAIL AT TRENTO LANE & TRENTO LOOP

NOT TO SCALE



BIO-RETENTION AREA IN PASEOS

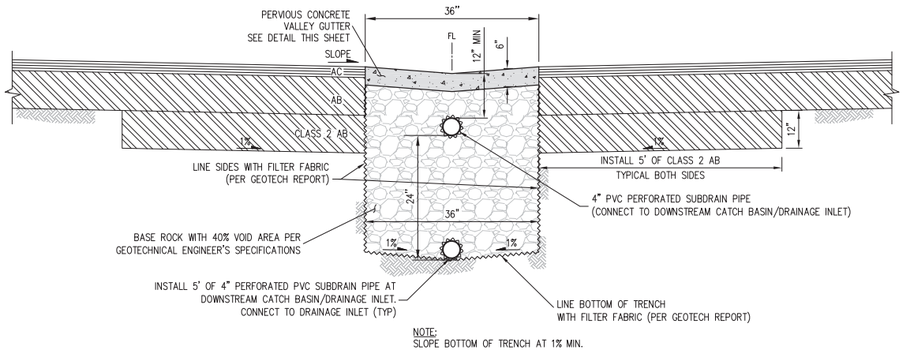
NOT TO SCALE



NOTE:
SLOPE BOTTOM OF TRENCH AT 1% MIN.

PERVIOUS VALLEY GUTTER AND TRENCH DETAIL AT ALLEYS

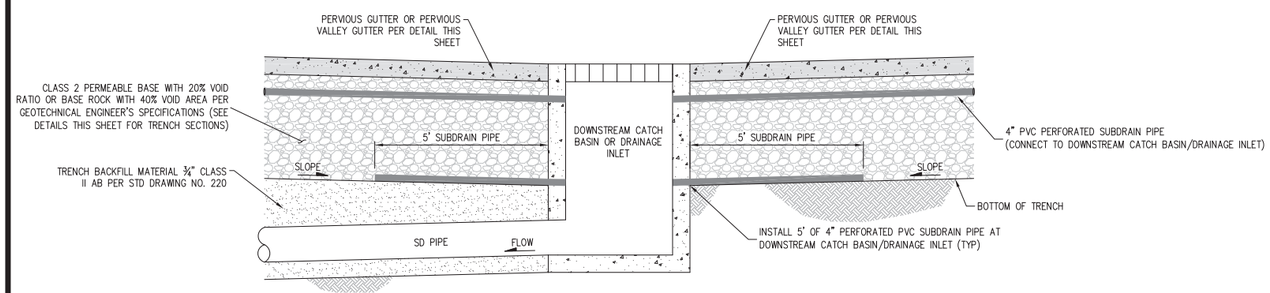
NOT TO SCALE



NOTE:
SLOPE BOTTOM OF TRENCH AT 1% MIN.

PERVIOUS VALLEY GUTTER AND TRENCH DETAIL AT PARKING BAYS

NOT TO SCALE



SUBDRAIN DETAIL AT STORM DRAIN CONNECTIONS

NOT TO SCALE

NO.	BY	DATE	REVISIONS	APPROVAL

DATE: 9/8/14
DRAWN BY: AAM
PROJ. ENGR: EMD
PROJ. MGR: JJN

REGISTERED PROFESSIONAL ENGINEER — JASON J. NEER — 59136 — CIVIL — STATE OF CALIFORNIA

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
2633 Camino Ramon, Suite 350 • San Ramon, CA 94583
Phone: 925-866-0322
www.cbandg.com

TRACT 10224
TRAVERSE

IMPROVEMENT PLANS

C.3 DETAILS

CITY OF MILPITAS — SANTA CLARA COUNTY — CALIFORNIA

SHEET NUMBER
14
OF 113

JOB NUMBER
2076-10

G:\2076\ACAD\IP\ON-SITE\IP14.DWG

VI. BMP Design Documentation

B. Data, Manuals, and Maintenance Documents

1. Bio-Retention Planters

Bioretention TC-32

Design Considerations

- Soil for Infiltration
- Tributary Area
- Slope
- Aesthetics
- Environmental Side-effects

Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

- ● Low
- ▲ Medium
- ■ High

California Experience

None documented. Bioretention has been used as a stormwater BMP since 1992. In addition to Prince George's County, MD and Alexandria, VA, bioretention has been used successfully at urban and suburban areas in Montgomery County, MD; Baltimore County, MD; Chesterfield County, VA; Prince William County, VA; Smith Mountain Lake State Park, VA; and Cary, NC.

Advantages

- Bioretention provides stormwater treatment that enhances the quality of downstream water bodies by temporarily storing runoff in the BMP and releasing it over a period of four days to the receiving water (EPA, 1999).
- The vegetation provides shade and wind breaks, absorbs noise, and improves an area's landscape.

Limitations

- The bioretention BMP is not recommended for areas with slopes greater than 20% or where mature tree removal would

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

be required since clogging may result, particularly if the BMP receives runoff with high sediment loads (EPA, 1999).

- Bioretention is not a suitable BMP at locations where the water table is within 6 feet of the ground surface and where the surrounding soil stratum is unstable.
- By design, bioretention BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water.
- In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Design and Sizing Guidelines

- The bioretention area should be sized to capture the design storm runoff.
- In areas where the native soil permeability is less than 0.5 in/hr an underdrain should be provided.
- Recommended minimum dimensions are 15 feet by 40 feet, although the preferred width is 25 feet. Excavated depth should be 4 feet.
- Area should drain completely within 72 hours.
- Approximately 1 tree or shrub per 50 ft^2 of bioretention area should be included.
- Cover area with about 3 inches of mulch.

Construction/Inspection Considerations

Bioretention area should not be established until contributing watershed is stabilized.

Performance

Bioretention removes stormwater pollutants through physical and biological processes, including adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization (EPA, 1999). Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Adequate contact time between the surface and pollutant must be provided for in the design of the system for this removal process to occur. Thus, the infiltration rate of the soils must not exceed those specified in the design criteria or pollutant removal may decrease. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the bioretention area media, such as the sand bed, ground cover, and planting soil.

Common particulates removed from stormwater include particulate organic matter, phosphorus, and suspended solids. Biological processes that occur in wetlands result in pollutant uptake by plants and microorganisms in the soil. Plant growth is sustained by the uptake of nutrients from the soils, with woody plants locking up these nutrients through the seasons. Microbial activity within the soil also contributes to the removal of nitrogen and organic matter. Nitrogen is removed by nitrifying and denitrifying bacteria, while aerobic bacteria are responsible for the decomposition of the organic matter. Microbial processes require oxygen and can result in depleted oxygen levels if the bioretention area is not adequately

aerated. Sedimentation occurs in the swale or ponding area as the velocity slows and solids fall out of suspension.

The removal effectiveness of bioretention has been studied during field and laboratory studies conducted by the University of Maryland (Davis et al, 1998). During these experiments, synthetic stormwater runoff was pumped through several laboratory and field bioretention areas to simulate typical storm events in Prince George's County, MD. Removal rates for heavy metals and nutrients are shown in Table 1.

Table 1 Laboratory and Estimated Bioretention Davis et al. (1998); PGDER (1993)

Pollutant	Removal Rate
Total Phosphorus	70-83%
Metals (Cu, Zn, Pb)	93-98%
TKN	68-80%
Total Suspended Solids	90%
Organics	90%
Bacteria	90%

Results for both the laboratory and field experiments were similar for each of the pollutants analyzed. Doubling or halving the influent pollutant levels had little effect on the effluent pollutants concentrations (Davis et al, 1998).

The microbial activity and plant uptake occurring in the bioretention area will likely result in higher removal rates than those determined for infiltration BMPs.

Siting Criteria

Bioretention BMPs are generally used to treat stormwater from impervious surfaces at commercial, residential, and industrial areas (EPA, 1999). Implementation of bioretention for stormwater management is ideal for median strips, parking lot islands, and swales. Moreover, the runoff in these areas can be designed to either divert directly into the bioretention area or convey into the bioretention area by a curb and gutter collection system.

The best location for bioretention areas is upland from inlets that receive sheet flow from graded areas and at areas that will be excavated (EPA, 1999). In order to maximize treatment effectiveness, the site must be graded in such a way that minimizes erosive conditions as sheet flow is conveyed to the treatment area. Locations where a bioretention area can be readily incorporated into the site plan without further environmental damage are preferred. Furthermore, to effectively minimize sediment loading in the treatment area, bioretention only should be used in stabilized drainage areas.

Additional Design Guidelines

The layout of the bioretention area is determined after site constraints such as location of utilities, underlying soils, existing vegetation, and drainage are considered (EPA, 1999). Sites with loamy sand soils are especially appropriate for bioretention because the excavated soil can be backfilled and used as the planting soil, thus eliminating the cost of importing planting soil.

The use of bioretention may not be feasible given an unstable surrounding soil stratum, soils with clay content greater than 25 percent, a site with slopes greater than 20 percent, and/or a site with mature trees that would be removed during construction of the BMP.

Bioretention can be designed to be off-line or on-line of the existing drainage system (EPA, 1999). The drainage area for a bioretention area should be between 0.1 and 0.4 hectares (0.25 and 1.0 acres). Larger drainage areas may require multiple bioretention areas. Furthermore, the maximum drainage area for a bioretention area is determined by the expected rainfall intensity and runoff rate. Stabilized areas may erode when velocities are greater than 5 feet per second (1.5 meter per second). The designer should determine the potential for erosive conditions at the site.

The size of the bioretention area, which is a function of the drainage area and the runoff generated from the area is sized to capture the water quality volume.

The recommended minimum dimensions of the bioretention area are 15 feet (4.6 meters) wide by 40 feet (12.2 meters) long, where the minimum width allows enough space for a dense, randomly-distributed area of trees and shrubs to become established. Thus replicating a natural forest and creating a microclimate, thereby enabling the bioretention area to tolerate the effects of heat stress, acid rain, runoff pollutants, and insect and disease infestations which landscaped areas in urban settings typically are unable to tolerate. The preferred width is 25 feet (7.6 meters), with a length of twice the width. Essentially, any facilities wider than 20 feet (6.1 meters) should be twice as long as they are wide, which promotes the distribution of flow and decreases the chances of concentrated flow.

In order to provide adequate storage and prevent water from standing for excessive periods of time the ponding depth of the bioretention area should not exceed 6 inches (15 centimeters). Water should not be left to stand for more than 72 hours. A restriction on the type of plants that can be used may be necessary due to some plants' water intolerance. Furthermore, if water is left standing for longer than 72 hours mosquitoes and other insects may start to breed.

The appropriate planting soil should be backfilled into the excavated bioretention area. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25 percent.

Generally the soil should have infiltration rates greater than 0.5 inches (1.25 centimeters) per hour, which is typical of sandy loams, loamy sands, or loams. The pH of the soil should range between 5.5 and 6.5, where pollutants such as organic nitrogen and phosphorus can be adsorbed by the soil and microbial activity can flourish. Additional requirements for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.

Soil tests should be performed for every 500 cubic yards (382 cubic meters) of planting soil, with the exception of pH and organic content tests, which are required only once per bioretention area (EPA, 1999). Planting soil should be 4 inches (10.1 centimeters) deeper than the bottom of the largest root ball and 4 feet (1.2 meters) altogether. This depth will provide adequate soil for the plants' root systems to become established, prevent plant damage due to severe wind, and provide adequate moisture capacity. Most sites will require excavation in order to obtain the recommended depth.

Planting soil depths of greater than 4 feet (1.2 meters) may require additional construction practices such as shoring measures (EPA, 1999). Planting soil should be placed in 18 inches or greater lifts and lightly compacted until the desired depth is reached. Since high canopy trees may be destroyed during maintenance the bioretention area should be vegetated to resemble a terrestrial forest community ecosystem that is dominated by understory trees. Three species each of both trees and shrubs are recommended to be planted at a rate of 2500 trees and shrubs per hectare (1000 per acre). For instance, a 15 foot (4.6 meter) by 40 foot (12.2 meter) bioretention area (600 square feet or 55.75 square meters) would require 14 trees and shrubs. The shrub-to-tree ratio should be 2:1 to 3:1.

Trees and shrubs should be planted when conditions are favorable. Vegetation should be watered at the end of each day for fourteen days following its planting. Plant species tolerant of pollutant loads and varying wet and dry conditions should be used in the bioretention area.

The designer should assess aesthetics, site layout, and maintenance requirements when selecting plant species. Adjacent non-native invasive species should be identified and the designer should take measures, such as providing a soil breach to eliminate the threat of these species invading the bioretention area. Regional landscaping manuals should be consulted to ensure that the planting of the bioretention area meets the landscaping requirements established by the local authorities. The designers should evaluate the best placement of vegetation within the bioretention area. Plants should be placed at irregular intervals to replicate a natural forest. Trees should be placed on the perimeter of the area to provide shade and shelter from the wind. Trees and shrubs can be sheltered from damaging flows if they are placed away from the path of the incoming runoff. In cold climates, species that are more tolerant to cold winds, such as evergreens, should be placed in windier areas of the site.

Following placement of the trees and shrubs, the ground cover and/or mulch should be established. Ground cover such as grasses or legumes can be planted at the beginning of the growing season. Mulch should be placed immediately after trees and shrubs are planted. Two to 3 inches (5 to 7.6 cm) of commercially-available fine shredded hardwood mulch or shredded hardwood chips should be applied to the bioretention area to protect from erosion.

Maintenance

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aide in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural

soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a biannual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation (EPA, 1999). Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of water standing and subsequent vector production if not routinely maintained.

In order to maintain the treatment area's appearance it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas. Mulch replacement should be done prior to the start of the wet season.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures. There is also the possibility that the cation exchange capacity of the soils in the cell will be significantly reduced over time. Depending on pollutant loads, soils may need to be replaced within 5-10 years of construction (LID, 2000).

Cost

Construction Cost

Construction cost estimates for a bioretention area are slightly greater than those for the required landscaping for a new development (EPA, 1999). A general rule of thumb (Coffman, 1999) is that residential bioretention areas average about $3 to $4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between $10 to $40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Retrofitting a site typically costs more, averaging $6,500 per bioretention area. The higher costs are attributed to the demolition of existing concrete, asphalt, and existing structures and the replacement of fill material with planting soil. The costs of retrofitting a commercial site in Maryland, Kettering Development, with 15 bioretention areas were estimated at $111,600.

In any bioretention area design, the cost of plants varies substantially and can account for a significant portion of the expenditures. While these cost estimates are slightly greater than those of typical landscaping treatment (due to the increased number of plantings, additional soil excavation, backfill material, use of underdrains etc.), those landscaping expenses that would be required regardless of the bioretention installation should be subtracted when determining the net cost.

Perhaps of most importance, however, the cost savings compared to the use of traditional structural stormwater conveyance systems makes bioretention areas quite attractive financially. For example, the use of bioretention can decrease the cost required for constructing stormwater conveyance systems at a site. A medical office building in Maryland was able to reduce the amount of storm drain pipe that was needed from 800 to 230 feet - a cost savings of $24,000 (PGDER, 1993). And a new residential development spent a total of approximately $100,000 using bioretention cells on each lot instead of nearly $400,000 for the traditional stormwater ponds that were originally planned (Rappahanock,). Also, in residential areas, stormwater management controls become a part of each property owner's landscape, reducing the public burden to maintain large centralized facilities.

Maintenance Cost

The operation and maintenance costs for a bioretention facility will be comparable to those of typical landscaping required for a site. Costs beyond the normal landscaping fees will include the cost for testing the soils and may include costs for a sand bed and planting soil.

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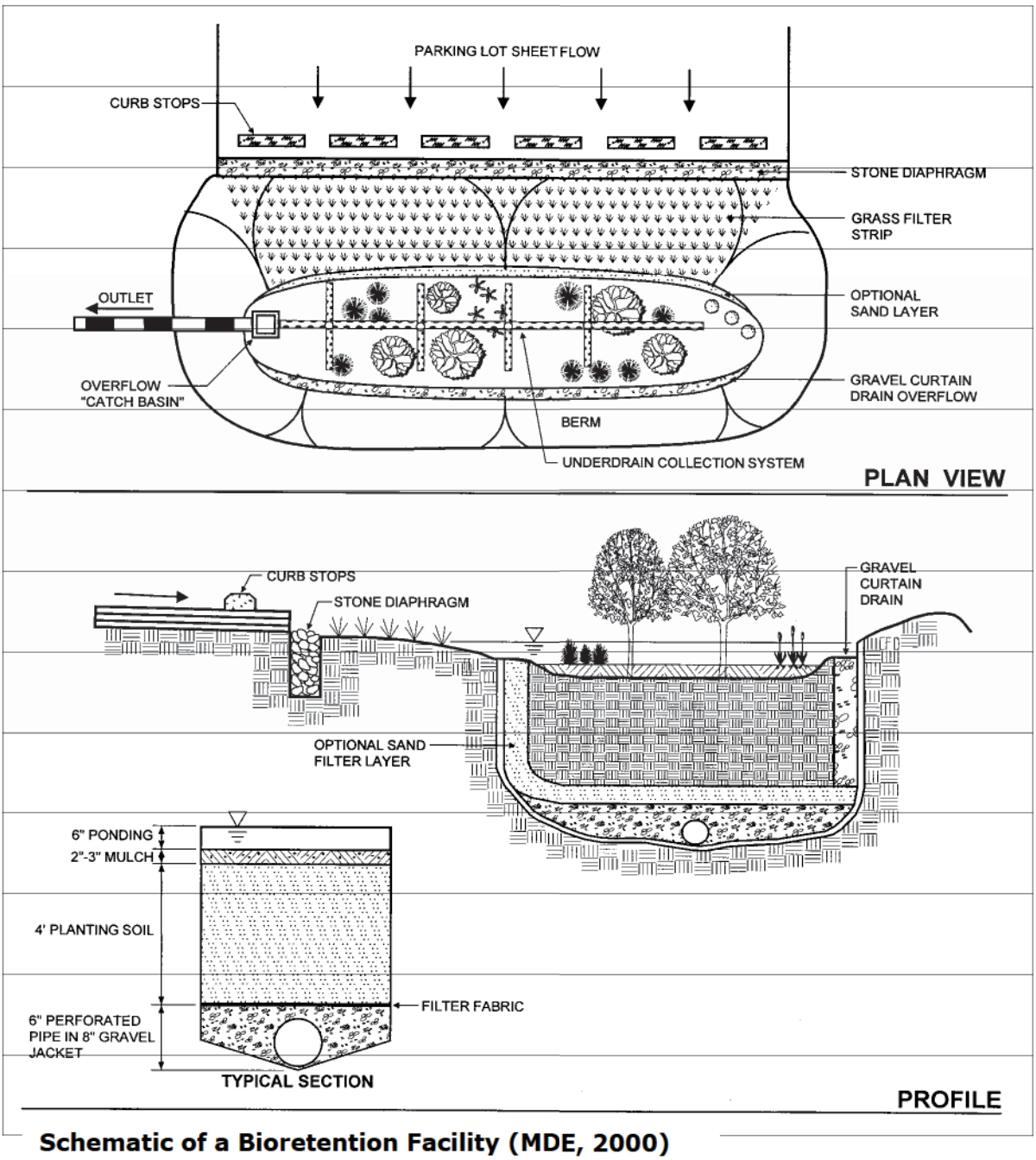

Schematic of a Bioretention Facility (MDE, 2000)

VII. BMP Design Documentation

B. Data, Manuals, and Maintenance Documents

2. Infiltration Trench and Pervious Concrete

Infiltration Trench TC-10

Design Considerations

- Accumulation of Metals
- Clogged Soil Outlet Structures
- Vegetation/Landscape Maintenance

Description

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	■
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

Caltrans constructed two infiltration trenches at highway maintenance stations in Southern California. Of these, one failed to operate to the design standard because of average soil infiltration rates lower than that measured in the single infiltration test. This highlights the critical need for appropriate evaluation of the site. Once in operation, little maintenance was required at either site.

Advantages

- Provides 100% reduction in the load discharged to surface waters.
- An important benefit of infiltration trenches is the approximation of pre-development hydrology during which a significant portion of the average annual rainfall runoff is infiltrated rather than flushed directly to creeks.
- If the water quality volume is adequately sized, infiltration trenches can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

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- As an underground BMP, trenches are unobtrusive and have little impact of site aesthetics.

Limitations

- Have a high failure rate if soil and subsurface conditions are not suitable.
- May not be appropriate for industrial sites or locations where spills may occur.
- The maximum contributing area to an individual infiltration practice should generally be less than 5 acres.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration trenches once clogged.

Design and Sizing Guidelines

- Provide pretreatment for infiltration trenches in order to reduce the sediment load. Pretreatment refers to design features that provide settling of large particles before runoff reaches a management practice, easing the long-term maintenance burden. Pretreatment is important for all structural stormwater management practices, but it is particularly important for infiltration practices. To ensure that pretreatment mechanisms are effective, designers should incorporate practices such as grassed swales, vegetated filter strips, detention, or a plunge pool in series.
- Specify locally available trench rock that is 1.5 to 2.5 inches in diameter.
- Determine the trench volume by assuming the WQV will fill the void space based on the computed porosity of the rock matrix (normally about 35%).
- Determine the bottom surface area needed to drain the trench within 72 hr by dividing the WQV by the infiltration rate.

$$d = \frac{WQV + RFV}{SA}$$

- Calculate trench depth using the following equation:

where:

D = Trench depth

WQV	=	Water quality volume
RFV	=	Rock fill volume
SA	=	Surface area of the trench bottom

- The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).
- Provide observation well to allow observation of drain time.
- May include a horizontal layer of filter fabric just below the surface of the trench to retain sediment and reduce the potential for clogging.

Construction/Inspection Considerations

Stabilize the entire area draining to the facility before construction begins. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction. Stabilize the entire contributing drainage area before allowing any runoff to enter once construction is complete.

Performance

Infiltration trenches eliminate the discharge of the water quality volume to surface receiving waters and consequently can be considered to have 100% removal of all pollutants within this volume. Transport of some of these constituents to groundwater is likely, although the attenuation in the soil and subsurface layers will be substantial for many constituents.

Infiltration trenches can be expected to remove up to 90 percent of sediments, metals, coliform bacteria and organic matter, and up to 60 percent of phosphorus and nitrogen in the infiltrated runoff (Schueler, 1992). Biochemical oxygen demand (BOD) removal is estimated to be between 70 to 80 percent. Lower removal rates for nitrate, chlorides and soluble metals should be expected, especially in sandy soils (Schueler, 1992). Pollutant removal efficiencies may be improved by using washed aggregate and adding organic matter and loam to the subsoil. The stone aggregate should be washed to remove dirt and fines before placement in the trench. The addition of organic material and loam to the trench subsoil may enhance metals removal through adsorption.

Siting Criteria

The use of infiltration trenches may be limited by a number of factors, including type of native soils, climate, and location of groundwater table. Site characteristics, such as excessive slope of the drainage area, fine-grained soil types, and proximate location of the water table and bedrock, may preclude the use of infiltration trenches. Generally, infiltration trenches are not suitable for areas with relatively impermeable soils containing clay and silt or in areas with fill.

As with any infiltration BMP, the potential for groundwater contamination must be carefully considered, especially if the groundwater is used for human consumption or agricultural purposes. The infiltration trench is not suitable for sites that use or store chemicals or hazardous materials unless hazardous and toxic materials are prevented from entering the trench. In these areas, other BMPs that do not allow interaction with the groundwater should be considered.

The potential for spills can be minimized by aggressive pollution prevention measures. Many municipalities and industries have developed comprehensive spill prevention control and countermeasure (SPCC) plans. These plans should be modified to include the infiltration trench and the contributing drainage area. For example, diversion structures can be used to prevent spills from entering the infiltration trench. Because of the potential to contaminate groundwater, extensive site investigation must be undertaken early in the site planning process to establish site suitability for the installation of an infiltration trench.

Longevity can be increased by careful geotechnical evaluation prior to construction and by designing and implementing an inspection and maintenance plan. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration trench. Pretreatment structures, such as a vegetated buffer strip or water quality inlet, can increase longevity by removing sediments, hydrocarbons, and other materials that may clog the trench. Regular maintenance, including the replacement of clogged aggregate, will also increase the effectiveness and life of the trench.

Evaluation of the viability of a particular site is the same as for infiltration basins and includes:

- Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30 percent clay or more than 40 percent of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.

- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15 percent should not be considered.

- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

Secondary Screening Based on Site Geotechnical Investigation

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.

- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.
- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Maintenance

Infiltration trenches required the least maintenance of any of the BMPs evaluated in the Caltrans study, with approximately 17 field hours spent on the operation and maintenance of each site. Inspection of the infiltration trench was the largest field activity, requiring approximately 8 hr/yr.

In addition to reduced water quality performance, clogged infiltration trenches with surface standing water can become a nuisance due to mosquito breeding. If the trench takes more than 72 hours to drain, then the rock fill should be removed and all dimensions of the trench should be increased by 2 inches to provide a fresh surface for infiltration.

Cost

Construction Cost

Infiltration trenches are somewhat expensive, when compared to other stormwater practices, in terms of cost per area treated. Typical construction costs, including contingency and design costs, are about \$5 per ft^3 of stormwater treated (SWRPC, 1991; Brown and Schueler, 1997). Actual construction costs may be much higher. The average construction cost of two infiltration trenches installed by Caltrans in southern California was about \$50/ft^3; however, these were constructed as retrofit installations.

Infiltration trenches typically consume about 2 to 3 percent of the site draining to them, which is relatively small. In addition, infiltration trenches can fit into thin, linear areas. Thus, they can generally fit into relatively unusable portions of a site.

Maintenance Cost

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly sited or maintained, infiltration trenches have a high failure rate. In general, maintenance costs for infiltration trenches are estimated at between 5 percent and 20 percent of the construction cost. More realistic values are probably closer to the 20-percent range, to ensure long-term functionality of the practice.

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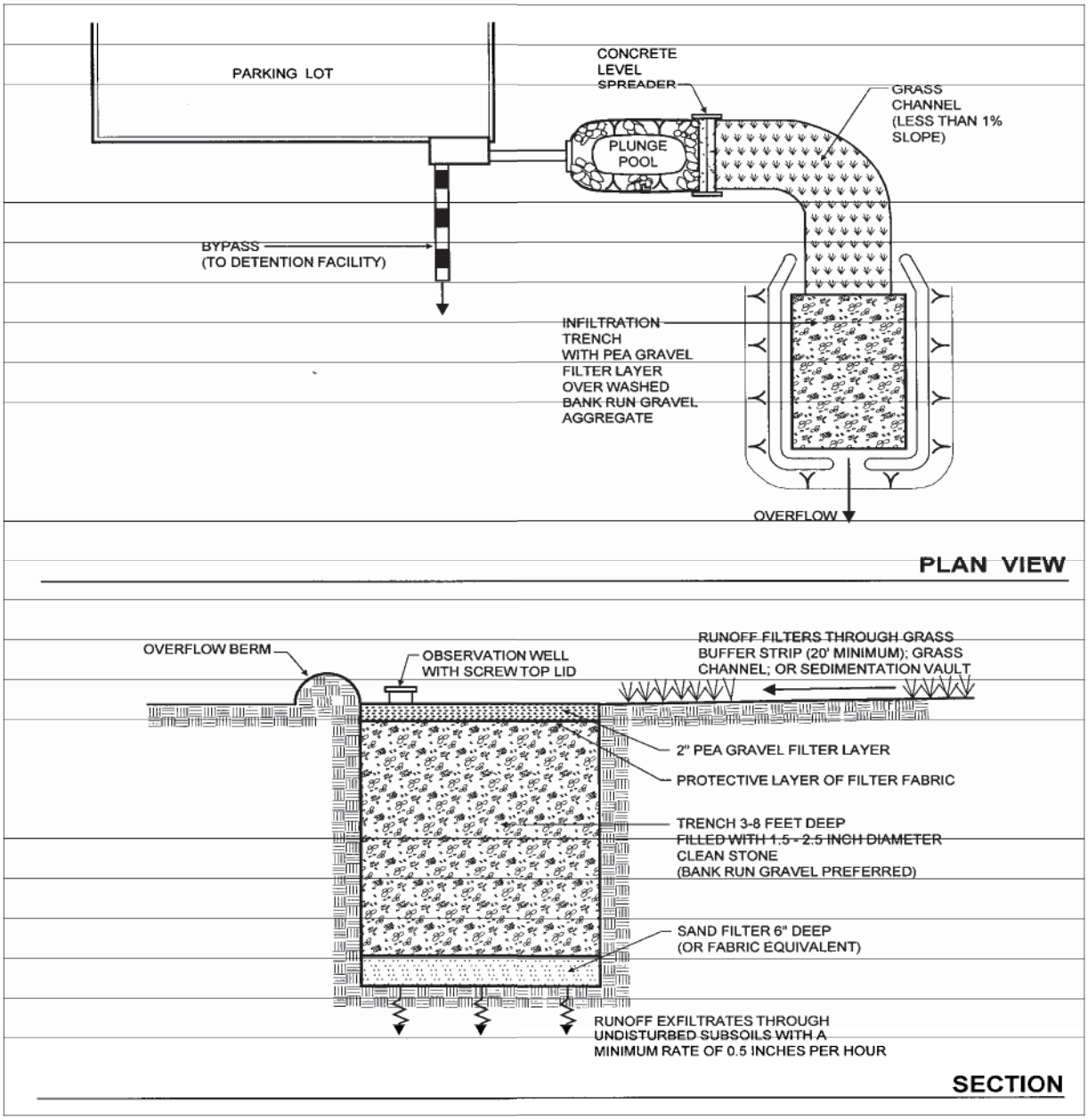
Infiltration Trench TC-10



PERVIOUS PAVEMENT

Stormwater Control for Small Projects

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Permeable Interlocking Concrete Pavers

Pervious pavement, also referred to as permeable pavement, contains pores or separation joints that allow water to flow through and seep into a base material (typically gravel or drain rock). Types of pervious pavement include porous asphalt and concrete, open joint pavers, interlocking concrete or permeable pavers, and plastic or concrete grid systems with gravel-filled voids.

Pervious pavement systems allow infiltration of stormwater into soils, thereby reducing runoff and the amount of pollutants that enter creeks, San Francisco Bay, the Pacific Ocean, and other water bodies. This improves water quality, helps reduce creek erosion, and can facilitate groundwater recharge. Pervious pavement is available in many different types that offer environmentally-friendly and aesthetically pleasing options for driveways, walkways, parking areas, and patios.

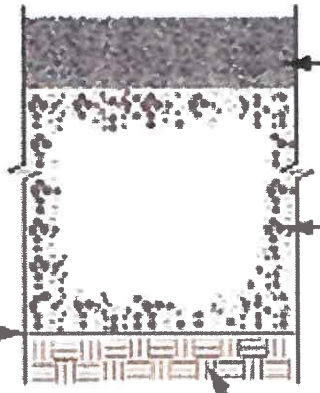
Is Pervious Pavement Feasible for My Project?

Pervious pavement is appropriate in locations with the following characteristics:

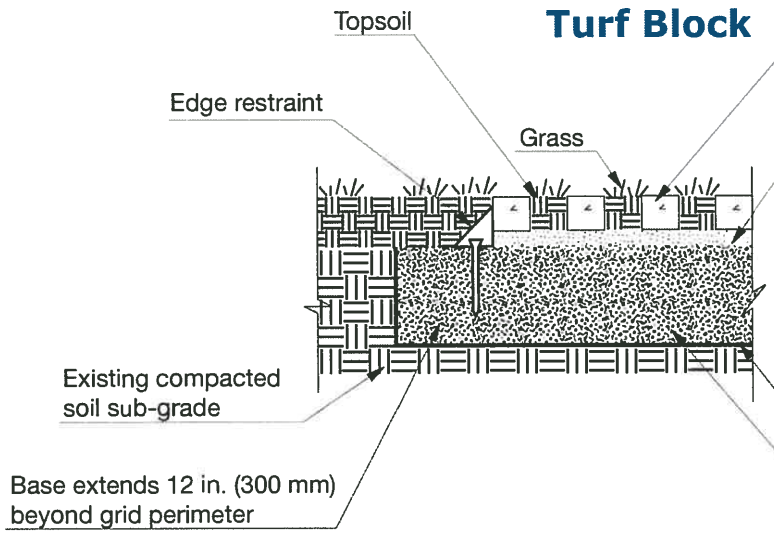
- The location is flat or nearly flat (a maximum 2% slope).
- The location is not in a seasonally wet area.
- The location is not close to a building foundation, unless measures are taken to prevent infiltration under the structure. (See Design Checklist.)

Typical Materials and Example Applications

Pervious Concrete

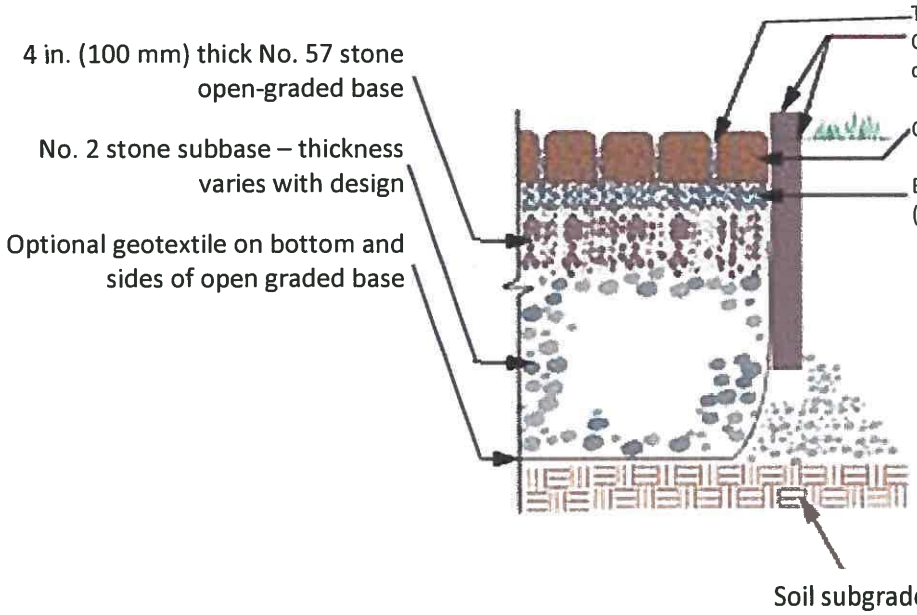


Turf Block



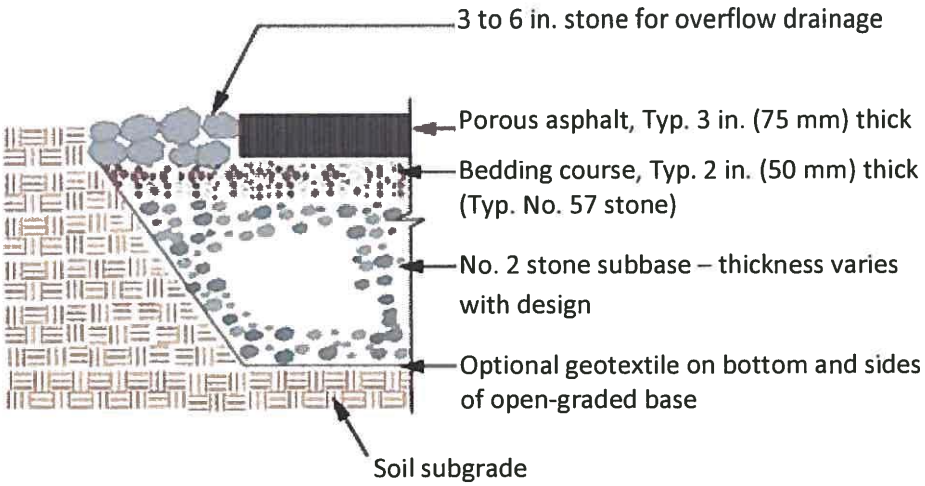
Typical Materials and Example Applications

Permeable Interlocking Concrete Pavers



Note: ASTM No. 3 or 4 stone may be substituted for No. 2 stone.
ASTM No. 89 or 9 stone may be used in the paver openings.

Porous Asphalt



Note: ASTM No. 3 or 4 stone may be substituted for No. 2 stone.
ASTM No. 89 or 9 stone may be used in the paver openings.

Design Checklist

When installing pervious pavement, the following design criteria should be considered.

- ❑ An open-graded base of crushed stone, which has 35 to 45 percent pore space, is installed below the surface pavement. The recommended base thickness is 6 inches for pedestrian use and 10 inches for driveways to provide adequate structural strength.
- ❑ Slope is flat or nearly flat (not greater than 2 percent).
- ❑ Flow directed to pervious pavement is dispersed so as not to be concentrated at a small area of pavement.
- ❑ No erodible areas drain onto the pavement.
- ❑ The subgrade is uniform and compaction is the minimum required for structural stability.
- ❑ If a subdrain is provided, its outlet elevation is a minimum of 3 inches above the bottom of the base course.
- ❑ A rigid edge is provided to retain granular pavements and unit pavers.
- ❑ If paving is close to a building, a barrier or impermeable liner may be required to keep water away from the building foundation.
- ❑ Pavers have a minimum thickness of 80 mm (3 1/8 inches) and are set in sand or gravel with minimum 3/8-inch gaps between pavers.
- ❑ Proprietary products must be installed per the manufacturer's specifications.
- ❑ The project complies with applicable sections of the current municipal code, including disabled access requirements and site drainage requirements, if applicable.

Maintenance Considerations

Once pervious pavement is installed, the following maintenance criteria should be followed:

- ❑ The use of leaf blowers on permeable pavement can force dirt and debris into pavement void spaces. Avoid blowing leaves, grass trimmings and other debris across permeable pavement.
- ❑ Remove weeds from pavement and replace missing sand or gravel between pavers as needed.
- ❑ Inspect subdrain outlets (if applicable) yearly to verify they are not blocked.
- ❑ Inspect pavement after rains for ponding or other visible problems. If there are problems with standing water, vacuum sweeping with specialized equipment may be required. Concrete grid pavers do not require sweeping.

Open Joint Pavers

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. The Interlocking Concrete Pavement Institute is acknowledged for contributing pavement sections, design details and specifications. The San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, and City of San Jose are acknowledged for images used in the fact sheet.

VI. BMP Design Documentation

B. Data, Manuals, and Maintenance Documents

3. Landscape Areas

LANDSCAPE DESIGNS FOR STORMWATER MANAGEMENT

Stormwater Control for Small Projects

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Dry creek infiltrates and conveys runoff.

Designing landscaped areas to soak up rainfall runoff from building roofs and paved areas helps protect water quality in local creeks and waterways. These landscape designs reduce polluted runoff and help prevent creek erosion.

As the runoff flows over vegetation and soil in the landscaped area, the water percolates into the ground and pollutants are filtered out or broken down by the soil and plants.

This fact sheet shows how you can design your landscape to absorb runoff from impervious surfaces, such as roofs, patios, driveways, and sidewalks, with landscape designs that can be very attractive.

If you are interested in capturing and storing water for irrigation use, see the Rain Barrel fact sheet in this series.

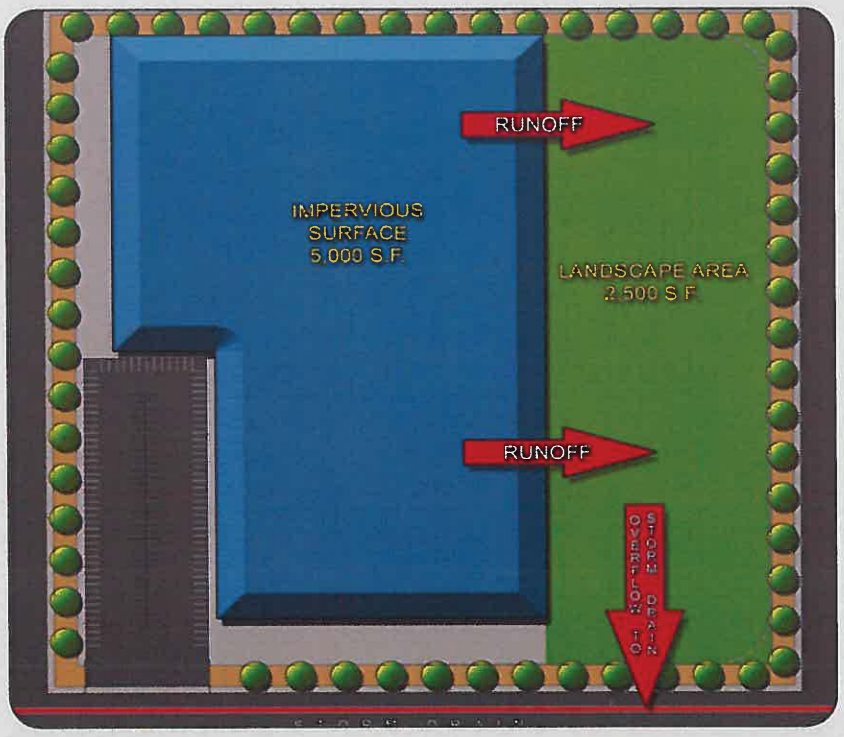
Can My Project Manage Stormwater in the Landscape?

Directing stormwater runoff to the landscape is suitable for sites with the following conditions:

- Roofs, driveways, parking areas, patios, and walkways that can drain to an existing landscape, or an area that may be converted to landscape.
- Areas of landscape with a slope of 5% or less are preferred; check with the municipality regarding requirements for steeper sites.
- Works best in well-drained soil; soil amendments may be used in areas with poor drainage.
- Landscaped areas that total at least 1/2 the size of the impervious area draining to it.
- Direct runoff away from building foundations.
- Runoff should not create ponding around trees and plants that won't tolerate wet conditions.

How Do I Size My Landscape?

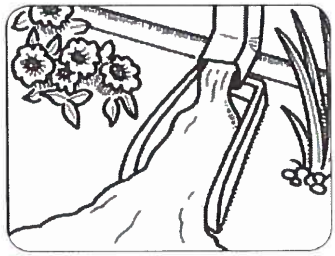
The landscaped area should be 50% of the size of the contributing impervious surface. For example (see below), to manage runoff from a 5,000 square foot roof or paved surface, you should have 2,500 square feet of landscaping.



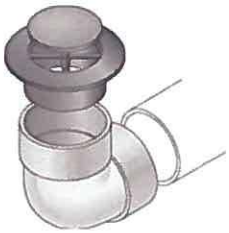
Techniques to Manage Stormwater in Landscaping

Direct Roof Runoff to Landscape

- Use additional piping to connect the downspout to the landscape if needed.
- Direct runoff away from building foundation.
- Prevent erosion by installing:
  - Splash blocks,
  - Rain chains,
  - Gravel area under a gutterless roof,
  - Pop-up drainage emitter connected to a pipe that carries runoff away from the foundation, or
  - Other energy dissipation technique.



Splash block

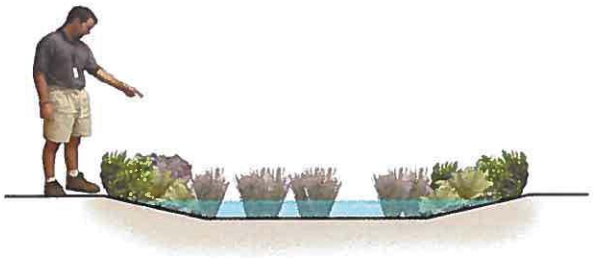


Pop-up emitter

Gravel area under a gutterless roof

Rain chain

Swales or Dry Creeks



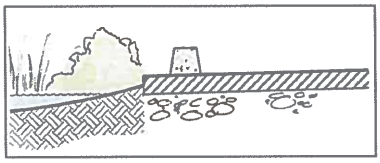
Cross section

Swales and dry creeks are narrow, linear depressions designed to capture and convey water. Swales imitate a natural creek's ability to slow, infiltrate, and filter stormwater. To install a swale follow these steps:

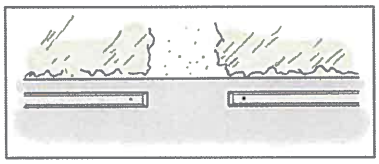
- Excavate a narrow linear depression that slopes down to provide a flow path for runoff. The path length (10 to 15 feet or more) should meander to slow water and prevent erosion.
- Use plants from creek and river ecosystems to help reduce erosion and increase evaporation of runoff.
- The end of the swale requires an outlet for high flows (another landscaped area or a yard drain). Talk to municipal staff to identify an appropriate discharge location.
- Contact municipal staff for a local list of plants suitable for swales.

Techniques to Manage Stormwater in Landscaping

Direct Parking Lot Runoff to Landscape



Cross section



View from above

During storms, parking lots generate large amounts of runoff, which picks up oils, grease, and metals from vehicles. Landscaped areas can be designed to absorb and filter this runoff.

- Landscaped areas must be below the paved elevation. Allow an elevation change of 4 to 6 inches between the pavement and the soil, so that vegetation or mulch build-up does not block the flow.
- Grade the paved area to direct runoff towards the landscaping.
- If possible, provide a long path for runoff to infiltrate (while meeting the landscaped area sizing on page 1).
- Provide multiple access points for runoff to enter the landscape. Install curb cuts or separate wheel stops for the water to flow through. Provide cobbles or other permanent erosion control at points of concentrated flow.

Manage Runoff from Driveways/Small Paved Areas

Driveways, sidewalks, patios, walkways, and other small paved areas can offer creative opportunities to drain runoff to landscaping.

- Install landscape adjacent to the paved surface, and grade the paved area so runoff flows toward the landscaping.
- Landscaped areas must be below the paved elevation. Allow an elevation change of 4 to 6 inches between the pavement and the soil, so that vegetation or mulch build-up does not block the flow.
- Install cobbles or rocks where runoff enters the landscape to avoid erosion.
- Use sizing ratio described on page 1.
- Use drought-tolerant native or climate-adapted plants to reduce irrigation.

Design Checklist

- ❑ Maximize the use of landscaping and natural areas that already exist. Try to design new landscapes immediately adjacent to impervious surfaces.
- ❑ Water should flow evenly (without concentrating runoff into small streams) from the impervious surface to the landscape; this will maximize the filtration and settling of sediment and pollutants and prevent erosion. The design should avoid allowing straight channels and streams to form.
- ❑ Amend soils to improve drainage, when necessary.
- ❑ If the project is located next to standard asphalt or concrete pavement, and there is concern about water undermining the pavement, include a water barrier in the design.
- ❑ Use curb cuts to create places where water can flow through to the landscape.
- ❑ Disconnect roof downspouts and redirect flow to adjacent landscapes. Disconnected downspout systems should incorporate a splash block to slow the runoff flow rate; a landscape flow path length of 10 to 15 feet is recommended.
- ❑ Use drought-tolerant native or climate-adapted plant species whenever possible. Avoid invasive or pest species. A list of invasive species may be found at the California Invasive Plant Council website (www.cal-ipc.org). Contact municipal staff for a list of plants suitable for stormwater management areas.
- ❑ Design the landscape area so that overflow from large storms discharges to another landscaped area or the storm drain system to prevent flooding.

Maintain Your Landscape

The following practices will help maintain your landscape to keep it attractive and managing stormwater runoff effectively.

- ❑ During dry months, irrigate during the first year to encourage root growth and establish the plants. In subsequent years, irrigate as needed by the plant species to maintain plant health.
- ❑ Repair signs of erosion immediately and prevent further erosion by reinforcing the surrounding area with ground cover or using rocks for energy dissipation.
- ❑ If standing water remains in the landscaped area for more than 4 days, use soil amendments to improve infiltration.
- ❑ Inspect the locations where water flows into a landscaped area from adjacent pavement to ensure that there is positive flow into the landscape, and vegetation or debris does not block the entrance point.

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. The Sonoma Valley Groundwater Management Program, San Mateo Countywide Water Pollution Prevention Program, City of San Jose, Sacramento Stormwater Quality Partnership, and the Purissima Hills Water District are acknowledged for images used in the fact sheet.

VI. BMP Design Documentation

C. Specific Operation and Maintenance Concerns and Troubleshooting

Biotreatment

1. Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.
2. Replace and amend plants and soils as necessary to insure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.
3. Visually inspect for ponding water to ensure system is functional.
4. After all major storm events remove trash, inspect drain pipes and bubble-up risers for obstructions and remove if necessary.
5. Continue general landscape maintenance, including pruning and cleanup throughout the year.
6. Irrigate throughout the dry season. Irrigation will be provided with sufficient quantity and frequency to allow plants to thrive.
7. Excavate, clean and or replace filter media (bio-treatment soil mix) to insure adequate infiltration rate (10 years or as needed).

Infiltration Trenches under Pervious Concrete Gutters

8. Regular sweeping of pervious surfaces to remove large debris.
9. Annual pressure washing of pervious surfaces.
10. Vacuum sweeping with specialized equipment.
11. Visually inspect infiltration areas for ponding water or physical distress to ensure system is functional.

Landscape Areas

12. Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.
13. Replace and amend plants and soils as necessary to insure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.
14. After all major storm events remove trash and inspect drain pipes obstructions and remove if necessary.
15. Continue general landscape maintenance, including pruning and cleanup throughout the year.
16. Irrigate throughout the dry season. Irrigation will be provided with sufficient quantity and frequency to allow plants to thrive.

VII. BMP Maintenance Schedule

A. Annual Maintenance Schedule for all BMPs

Treatment BMPs require minimum maintenance similar to that for any landscape areas. BMPs must be regularly maintained to insure that they continue to be effective and do not cause flooding or other harmful nuisances.

B. Inspection and Maintenance Schedule for each BMP

1. *Routine Inspection and Maintenance:* Regular inspections shall be made of all BMP features and any maintenance performed as needed. Any collected debris shall be removed from the feature.
   - The Bio-Retention planters shall be maintained as described in TC-32 of the California Stormwater BMP Handbook prepared by CASQA
   - The pervious concrete shall be regularly swept and power washed to maintain the pervious property of the concrete.

2. *Annual Inspection and Maintenance:* Annual inspections and maintenance shall be performed as described above in the "Routine Inspection and Maintenance" Section.

3. *Inspection and Maintenance during the Rainy Season:* All BMP features shall be inspected immediately after the first rain event of the season. During the rainy season the BMP features shall be inspected at least once every 30 days and after any significant rain event.

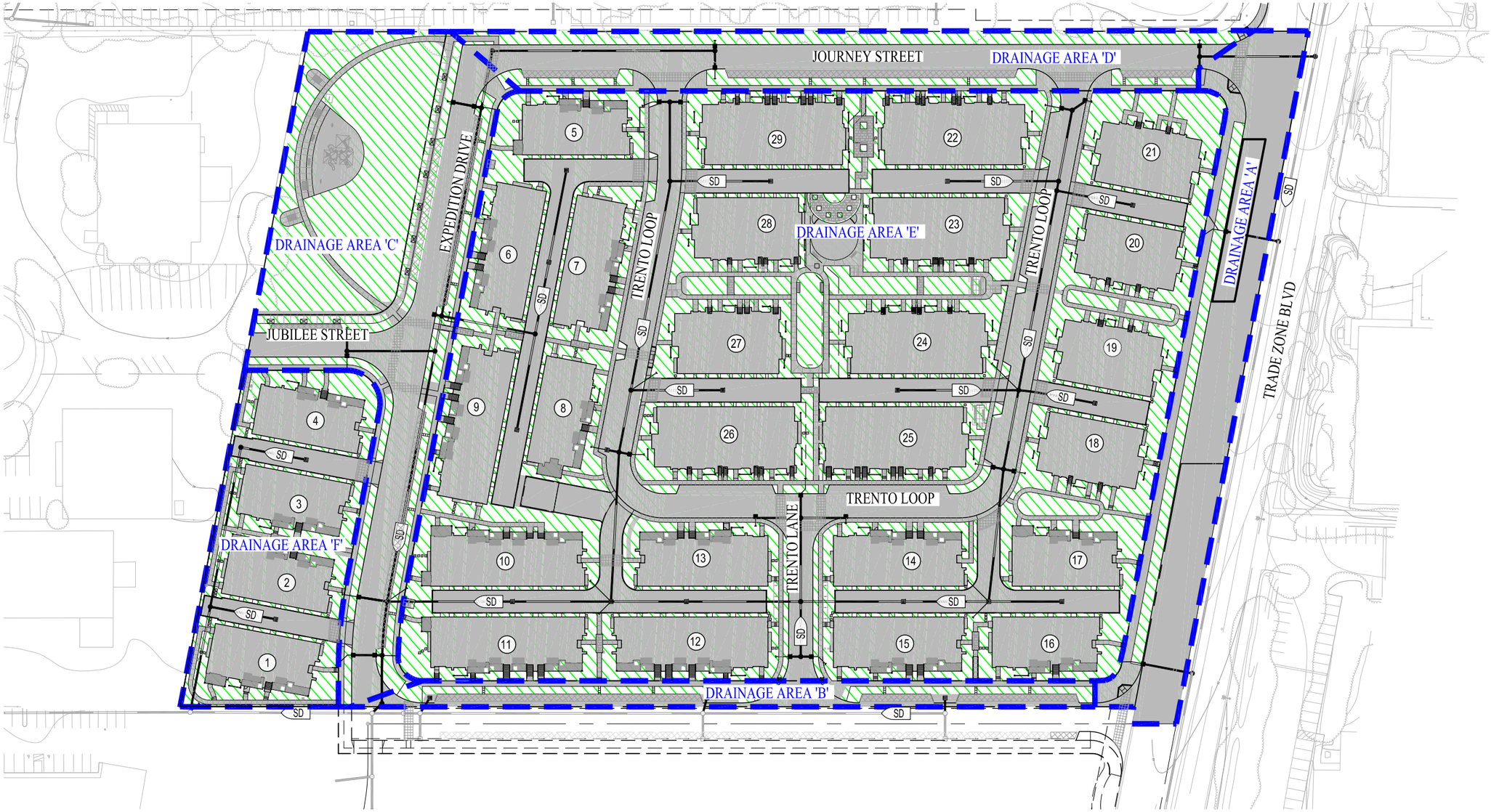
C. Service Agreement Information

The frequency of cleaning the treatment BMPs will depend on the generation of trash and debris and sediment at the site. Cleanout and preventive maintenance schedules will be determined based on operating experience.

VIII. Copy of O&M Agreement

(Final Recorded Copy to be Inserted)

Appendix



LEGEND

PROJECT BOUNDARY

DRAINAGE AREA

EXISTING STORM DRAIN

PROPOSED STORM DRAIN

(1) BUILDING NUMBER

IMPERVIOUS AREA - 73%

PERVIOUS AREA - 27%

FIGURE 1
DRAINAGE AREAS
TRAVERSE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

SCALE: NTS DATE: SEPTEMBER 2014

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
2633 CAMINO RAMON, SUITE 350
SAN RAMON, CALIFORNIA 94583
(925) 866-0322
FAX (925) 866-8575

G:\2076\ACAD\EXHIBITS\REPORTS\SWCP FIGURES\FIGURE 4 - PROPOSED CONDITIONS.DWG

Appendix J

Project No.
10991.000.000

April 8, 2014

Mr. Ricardo Maciel
Toll Brothers
2000 Crow Canyon Place, Suite 200
San Ramon, CA 94583

Subject: Traverse Improvement Plan
Milpitas, California

REVIEW OF STORMWATER MANAGEMENT PLAN

References:
1. Carlson, Barbee & Gibson, Inc.; Stormwater Control Plan –Traverse; Milpitas, California; March 24, 2014.

2. San Francisco Bay Municipal Regional Permit (MRP), California Regional Water Quality Control Board, Order No. R2-2009-0074, October 14, 2009 (revised November 28, 2011), Provision C.3.

Dear Mr. Maciel:

At your request and with your authorization, we have performed a water resources peer review of the referenced Stormwater Control Plan for your Traverse project in Milpitas, California (Reference 1). The purpose of our peer review was to confirm that the project submittals were prepared in general conformance with the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) NPDES Permit (Reference 2).

PROJECT DESCRIPTION

The project intends to redevelop the approximately 12.5-acre site located in an industrial area north of Trade Zone Boulevard between Montague Expressway and Lundy Avenue into a residential development. The Project will include 29 multistory buildings, public and private roadways, a public park, private common areas, and landscaped paseos. The C.3 Data Form for the project indicates that it is located in the Lower Penitencia watershed.

We reviewed the following submittals with regard to this project:

- The completed C.3 Data Form
- The completed Infiltration/Harvesting and Use Feasibility Screening Worksheet
- The completed Stormwater Control Plan

We reviewed the project submittals for compliance with the stormwater requirements in the SCVURPPP NPDES Permit. Our findings are presented below:

APPLICABILITY OF NPDES PERMIT PROVISION C.3. REQUIREMENTS

According to the C.3 Data Form, there is a total of 130,680 square feet (sf) of existing impervious surface. The form indicates that the total post project impervious area will be 359,730 sf. Therefore, since 359,730 sf is greater than the C.3 threshold of 10,000 sf, the C.3 source control, site design, and treatment requirements do apply to this project.

Per Provision C.3.c.i (1) and (2), the project must include site design measures and source controls. Since the project will receive final discretionary approval after December 1, 2011, it must also comply with the Municipal Regional Stormwater Permit (MRP) requirements for low impact development (LID) treatment. LID treatment measures must be used to treat 100 percent of the amount of runoff specified in MRP Provision C.3.d. LID treatment measures including infiltration, evapotranspiration or rainwater harvesting and use, or if these measures are infeasible, biotreatment (such as a bioretention area that does not infiltrate the full C.3.d amount of runoff).

The hydromodification management (HM) requirements do not apply to this project, based on its location in an area defined as greater than 65 percent imperviousness as shown on the Santa Clara Valley Urban Runoff Pollution Prevention Program's map entitled HMP Applicability Map – City of Milpitas. The Hydromodification Standard and associated requirements do not apply to projects within this category; therefore, the project is exempt from the HM requirements.

PROPOSED STORMWATER MEASURES AND SIZING CALCULATIONS.

a. As indicated in the C.3 Data Form, the source controls proposed for the project are sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain, beneficial landscaping (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment), maintenance activity (pavement sweeping, catch basin cleaning, and good housekeeping), and stenciling of storm drain inlets. The source controls are not indicated on the plan details.

b. As indicated in the C.3 Data Form, the site design measures proposed for the project include minimizing impervious surfaces, clustering structures/pavement, disconnected downspouts, pervious pavement, and other self-treating areas.

  i. Site sidewalks and detached street sidewalks will be directed to landscape areas for treatment. These landscape areas have less than a 2:1 ratio of impervious area to the receiving pervious area making them consistent with guidance in the Santa Clara Valley Urban Runoff Pollution Prevention Program's (SCVURPPP) C.3 Stormwater Handbook for Self-Retaining Treatment.

c. The proposed stormwater treatment measures consist of a combination of flow-through planters, pervious concrete gutter (pervious pavement drain rock) and valley gutters (pervious pavement drain rock). The flow-through planters will treat 29 building/roof drainage areas and 14 public street drainage areas. The pervious concrete gutters will treat runoff from the street and monolithic sidewalk drainage that will flow through the pervious

gutter and into an infiltration storage area. Stormwater from the private alleys and building drainage will be treated through infiltration under the proposed valley gutters in the center of the alley. The drainage will flow through the pervious concrete and into an infiltration storage area. Additionally, 0.35 acres of roadway for Momentum Drive will be drained to a manhole treatment structure at the north end of Momentum Drive. Comments on the treatment measure selection and design are provided below:

i. The applicant submitted a completed Infiltration/Harvesting and Use Feasibility Screening Worksheet evaluating the feasibility of treating the amount of runoff specified in Provision C.3.d with infiltration or harvesting and use. The completed worksheet states that infiltration of 80 percent of the annual runoff is infeasible because the site soils either have a saturated hydraulic conductivity of less than 1.6 inches per hour or consist of Type C or D soils. With regard to the feasibility of harvesting and use, the applicant evaluated the feasibility of harvesting and using stormwater runoff from the entire site for either landscape irrigation or non-potable industrial use. The evaluation on the Infiltration/Harvesting and Use Feasibility Screening Worksheet concluded that there is insufficient demand for either landscape irrigation or non-potable industrial use to use the water quality design volume, and therefore it is infeasible to meet stormwater treatment requirements by harvesting and using stormwater runoff. Since the applicant has demonstrated the infeasibility of infiltration and rainwater harvesting and will treat the entire 80 percent of annual runoff, the use of biotreatment (flow-through planters) and other BMPs that do not infiltrate stormwater is acceptable.

ii. The flow-through planters were sized using a combination flow and volume design basis sizing methodology. A sample calculation is provided in Appendix B and the results of the flow through planter sizing calculations are summarized in Table 3: Flow and Volume Combination Calculations in the Stormwater Control Plan. We confirmed that the calculations were done correctly based on the sample calculations provided.

iii. A flow through planter detail is included on Figure 10 for the on-site planters and on Figure 11 for the planters within the public streets. Both details show a minimum 18-inch biotreatment soil depth and a minimum 12-inch depth of drain rock (Caltrans Standard Section 68-1.025 Class 2 permeable material or equivalent) as the base layer, both of which are consistent with guidance in the Santa Clara Valley Urban Runoff Pollution Prevention Program's (SCVURPPP) C.3 Stormwater Handbook.

iv. The flow through planter details show a ponding depth of four inches. Although the SCVURPPP C.3 Stormwater Handbook recommends a ponding depth of six to twelve inches, this is not a requirement. If the ponding depth were increased to six inches; however, the surface area of the planters would be optimized.

v. The flow through planter details both show a four-inch perforated PVC subdrain pipe in the base layer consistent with the guidance in the Santa Clara Valley Urban Runoff Pollution Prevention Program's (SCVURPPP) C.3 Stormwater Handbook.

vi. The pervious concrete gutters were sized using the Volume based CASQA BMP Handbook Method. A calculation is provided in Appendix B using a 1 foot section of typical roadway (11' travel way + 4' sidewalk = 15' total) to determine a volume of water needed to be treated. The gutter section was then designed to accommodate this section assuming a 40 percent void ratio within the pervious pavement and using a depth which represents the storage volume below the overflow outlet pipe. The detail for a typical section is provided in Figure 12. Materials and example applications from the SCVURPPP guidelines are provided in Appendix B.

vii. The pervious valley gutters were sized using the Volume based CASQA BMP Handbook Method. A calculation is provided in Appendix B of the "worst case scenario" in which the largest drainage area was used to determine a volume of water needed to be treated. The valley gutter section was then designed to accommodate this volume assuming a 40 percent void ratio within the pervious pavement and using a depth which represents the storage volume below the overflow outlet pipe. The detail for a typical section is provided in Figure 13; materials and example applications from the SCVURPPP guidelines are provided in Appendix B.

viii. An existing Up-Flow Manhole treatment structure installed for an adjacent PACE project will be used to treat 0.35 acres of roadway from Momentum Drive. Flow-based calculations were performed to determine that the 0.35 acres from Momentum Drive produce 0.053 cubic feet per second (cfs) of treatment flow. The Up-Flow Manhole has an additional treatment capacity of 0.223 cfs; therefore, it has sufficient capacity to treat the runoff from Momentum Drive. A sizing summary of the manhole is provided in a table on Figure 9.

CONCLUSIONS

It is our opinion that the proposed treatment measures are acceptable and will treat the water quality design storm runoff from the project as required by the SCVURPPP NPDES Permit Provision C.3 requirements.

When the C.3 Data Form and the project plans are finalized, as described in the Recommendations below, the project will include adequate source control measures and site design measures.

RECOMMENDATIONS

The City may approve the stormwater treatment measures, site design measures, and source control measures proposed for the project based on our review of the referenced material above. We recommend that the following refinements be incorporated in the Final Stormwater Management Plan or project conditions of approval as appropriate.

a. The City should require a geotechnical engineer to review the pervious concrete gutter (pervious pavement drain rock) and valley gutters (pervious pavement drain rock) designs for structural stability and feasibility.

b. The City should apply conditions of approval requiring pollutant source control measures, including a covered dumpster area with connection to sanitary sewer, beneficial landscaping (minimizing irrigation, runoff, synthetic pesticides, and quick release fertilizer), storm drain labeling, and maintenance activities (pavement sweeping, catch basin cleaning, and trash removal). The source control measures should be indicated on the project plans.

c. The City should request the landscape architect to review the choice of plants in the flow-through planters and submit documentation that the selected plants have relevant characteristics equivalent to those listed in the SCVURPPP C.3 Stormwater Handbook, Appendix D, Plant List and Planting Guidance for Landscaped-Based Stormwater Treatment Measures.

d. The City should require the applicant to submit a maintenance plan showing how the stormwater treatment measures and areas of pervious paving will be maintained. Maintenance plan templates are provided in Appendix G of the SCVURPPP C.3 Handbook.

e. The City should require the applicant to sign a maintenance agreement or other maintenance assurance for maintaining the stormwater treatment measures and source controls.

If you have any questions regarding the contents of this letter, please contact us.

Sincerely,

ENGEO Incorporated

Hilary Mann

Hilary Mann

Jonathan Buck, GE

REGISTERED PROFESSIONAL ENGINEER
JONATHAN BUCK
No. 2958
Exp. 9/30/2014
GEOTECHNICAL
STATE OF CALIFORNIA

hm/jdb/pcg

Appendix K

July 10, 2014

Project No.
10375.002.000

Mr. Jim Immer
K. Hovnanian Homes
1375 Exposition Boulevard, Suite 300
Sacramento, CA 95815

Subject: Traverse Residential Development
Trade Zone Boulevard
Milpitas, California

CLARIFICATION REGARDING IN-PLACE SOILS

Reference: Cornerstone Earth Group; Soil Management Completion Report, 569, 573, 595, and 615, and 625 Trade Zone Boulevard, Milpitas, California; March 21, 2014.

Dear Mr. Immer:

As requested, we have prepared this letter that clarifies soil conditions at the Property following site remediation activities. The referenced document provides a comprehensive overview of the site remediation performed at the Property during 2013 and 2014. As presented in the document, cleanup goals were selected based on screening levels published by the Cal-EPA Department of Toxic Substances Control (DTSC), the San Francisco Bay Regional Water Quality Control Board (SFRWQCB), and the United States Environmental Protection Agency (USEPA) Region IX. The confirmation samples collected from remaining in-place soils exhibited concentrations at or below the cleanup goals presented in the referenced report. The cleanup goals and detected remaining target analyte concentrations were within general conformance with the Environmental Screening Levels (ESLs) published by SFRWQCB for shallow soils assuming a residential land use where groundwater is considered a potential domestic water source (Table A-1) that were in effect at the time remedial activities commenced. This ESL table incorporates groundwater protection into the respective screening levels. Therefore, it would not be expected that infiltration of precipitation through soils that remain onsite would be expected to pose a risk to groundwater quality.

We look forward to our continued service on this project. If you have any questions regarding this document, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

Jeffrey A. Adams, PhD, PE

Shawn Munger, CHG

jaa/sm/jf

Appendix L

Project No.
10375.002.000

September 9, 2014

Mr. Jim Immer
K. Hovnanian Homes
1375 Exposition Boulevard, Suite 300
Sacramento, California 95815

Subject: Traverse Residential Development
Trade Zone Boulevard
Milpitas, California

REVIEW OF IMPROVEMENT PLANS

References:

1. ENGEO; Geotechnical Engineer of Record, Traverse Residential Development, Trade Zone Boulevard, Milpitas, California; July 22, 2014; Project No. 10375.002.000.
2. ENGEO; Preliminary Flexible Pavement Design Recommendations, Traverse Residential Development, Trade Zone Boulevard, Milpitas, California; September 4, 2014; Project No. 10375.002.000.
3. ENGEO; Review of Stormwater Management Plan, Traverse Improvement Plan, Milpitas, California; April 8, 2014; Project No. 10991.000.000.
4. Cornerstone Earth Group, "Geotechnical Observation and Testing Services During SMP Implementation and Rough Grading, Traverse Residential Development, 569-573, 595-615, and 625 Trade Zone Boulevard, Milpitas, California," May 22, 2014.
5. Stormtech; Porosity of Structural Backfill, Tech Sheet #1, November 2012.
6. Naval Facilities Engineering Command; Design Manual 7.01 – Soil Mechanics, September 1986, Page 7.1-22.

Dear Mr. Immer:

At your request, we reviewed the geotechnical aspects of the private and public improvement plan sets for the proposed Traverse project in Milpitas, California. The purpose of our review was to comment if the plans were prepared in general accordance with the recommendations contained in the references, and to provide supplemental recommendations as necessary.

The roughly 12.2 acre rectangular-shaped site is located off Trade Zone Boulevard approximately ¼ mile east of the intersection McCandless Drive and Trade Zone Boulevard. The rough grading at the site was previously completed. The previous grading observation and testing services were provided by Cornerstone Earth Group (CEG) as reported in Reference 4. The remaining site grading is anticipated to consist of minor cuts and fills (less than about 2 feet) up to establish proposed street and building pad grades.

The proposed development consists of 29 townhome and condominium buildings with appurtenant street access and associated parking, a park, and landscape areas. It is anticipated that the buildings will be two- to three-stories, wood frame construction with floor slabs near existing site grades.

PRIVATE IMPROVEMENT PLANS

The private on-site improvement plans were prepared by Carlson, Barbee, & Gibson, Inc. (CBG), dated September 8, 2014. The plan set includes a pavement design chart, typical sections and details, stormwater quality (C.3) details, plan and profiles, and fine grading plans.

Planned bioretention areas within the Traverse project are situated adjacent to proposed buildings, streets, and paved pedestrian pathways and sidewalks. Pervious valley gutters and curbs with subsurface infiltration trenches are shown on select private street and parking bay areas and alley locations. The infiltration trenches for the alleys will extend the entire width of the alleys.

PUBLIC IMPROVEMENT PLANS

The off-site public improvement plans were prepared by CBG, dated September 4, 2014. The plan set includes a pavement design chart, typical sections and details, stormwater quality (C.3) details, and plan and profiles.

Proposed street sections on Sheet 7 indicate the majority of streets will be constructed with landscaping or bioretention directly behind the streets. Planned bioretention areas are situated adjacent to proposed public streets and sidewalks.

PLAN REVIEW COMMENTS

Based on our review, it is our opinion that the plans are in conformance with our recommendations, with the following considerations:

- Waterproof barriers should be Deep Root Moisture Barriers (or approved equivalent). All joints and penetrations should be sealed or repaired per manufacturer recommendations. Where applicable, the waterproof barrier should be trenched at least 4 inches into subgrade soils.

- As recommended in Reference 1, to reduce the potential for lateral migration of water into utility trench backfill, low-permeability clay soil, sand-cement slurry, or lean concrete plugs at least 18 inches thick should be placed at curb line and building edge crossings. Plugs should also be used where utilities cross infiltration trenches.

- We understand bioretention construction will occur after foundation construction. Where possible, bioretention areas should be field-located at least 3 feet away from buildings. Where bioretention areas are located within this distance (but no closer than 1½ feet from buildings), one of the following options should be followed.

    - The perimeter foundations of the building should be deepened, such that the bottom edge of the bioretention excavation is shallower than an imaginary 1:1 projection from the foundation embedment level.

- The contractor should excavate and backfill bioretention areas in the same day to protect existing improvements.

Bioretention filter material should be compacted to between 85 and 90 percent relative compaction. As with any excavation adjacent to improvements, the exposure time should be limited such that improvements are not detrimentally impacted. The contractor is responsible for conducting all excavation and shoring in accordance with OSHA, and in a manner that does not cause damage to adjacent improvements during construction and future maintenance of the bioretention areas.

- Infiltration trenches for pervious valley gutters and curbs on select private street and parking bay areas should comprise 1½-inch minus clean crushed rock. We believe the design-assumed porosity of 40 percent is reasonable for compacted 1½-inch clean crushed rock (Reference 5). The 1½-inch minus clean crushed rock should be placed in thin lifts (to be determined in the field), and the material should be compacted using vibratory methods.

- Infiltration trenches for pervious valley gutters on private alleys should comprise Caltrans Class 2 permeable material. We believe the design-assumed porosity of 20 percent is reasonable for compacted Caltrans Class 2 permeable material (Reference 6). Caltrans Class 2 permeable material should be placed in thin lifts (to be determined in the field), and the material should be compacted using vibratory methods.

- Based on our experience with clayey engineered fill soil materials such as those found on this site, an average drawdown time of 72 hours is anticipated in the infiltration throughout throughout an average rain year.

- A monitoring and maintenance program should be implemented for bioretention areas and infiltration trench locations.

We make no representations as to the accuracy of dimensions, measurements, calculations or any portion of the design. If you have any questions regarding the contents of this letter, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

Andrew H. Firmin, GE Theodore P. Bayham, GE